

DETAILED
SHELTER RESPONSE PROFILE

SOMALIA

LOCAL BUILDING CULTURES
FOR SUSTAINABLE
AND RESILIENT HABITATS

1ST EDITION
FEBRUARY 2023





Shelter Response Profiles (SRP)



BACKGROUND

The organisations backing this document (see back cover) have been working for several years on the elaboration and dissemination of methods for the assessment of local building cultures (LBC), especially regarding their potential to contribute to Disaster Risk Reduction (DRR), and also to shelter and housing responses in post-conflict situations. The aim is to facilitate the identification of the strengths and weaknesses of LBC and the opportunities they offer – in an adapted version if necessary – in housing reconstruction, retrofitting or improvement projects.

In doing so, it is essential to consider that families and communities often live in changing environments due to factors such as conflict, climate change, urbanization, globalization, and changing socio-cultural attitudes. Thus, even if local practices are meaningful, they are challenged, and it is still advisable to find locally manageable solutions and limit innovations so that they can be adopted toward sustainable development and increased local resilience capacity.

SRPs are part of a broader set of tools and documents developed and used to facilitate contextualization of responses. They are one of the proposed activities of the Protocol “[Informing choice for better shelter](#)” in its step 1 “Understanding the context”, developed by the “[Promoting Safer Building Working Group](#)” (now evolved towards [Recovery CoP](#)) of the Global Shelter Cluster.



OBJECTIVES

SRPs have several complementary objectives:

- To help to recognise the importance of understanding a context before proposing any action or project.
- To favour the development of shelter and human settlements responses more focused on localization, reduction of climate change and environmental impacts, and promotion of self-recovery strategies.
- To help better consider the existing construction sector, natural and human resources, local knowledge, existing

Cover photos (from top to bottom):

Aqal (nomadic hut) in Dollow, Jubaland - CC Enrique Sevillano Gutiérrez

Baraako (wattle and daub construction) in Baidoa, South West State - CC Enrique Sevillano Gutiérrez

Stone (and probably adobe) constructions in Berbera, Somaliland - CC Ignacio Gallego

solutions and good practices, and local cultural and social practices such as existing DRR knowledge, know-how and techniques at various scales (materials, building systems, house, compound, settlement organisation).

- To give a non-exhaustive overview of a country or territory: demographic, cultural, social, and economic data; hazards, environment, and climate change impacts; impacts of crises in the population; HLP issues; legal and institutional framework; construction sector, etc., and so to help orient practitioners in new contexts.
- To eventually become an advocacy tool for the shelter sector/cluster members, agencies, donors, or local authorities for more localized actions, facilitating self-recovery and communities' resilience.



CONTENT AND SUGGESTIONS FOR USE

This document introduces reference data on local building cultures and sociocultural strategies that result in people's resilience. It also provides evaluation criteria that can help in elaborating locally adapted project-strategies.

Context and details differ from place to place, and stakeholders benefit from the collected data to make comprehensive and accurate decisions. Thus, SRPs should not be considered exhaustive. They are a first level of information that needs to be deepened through field analysis of the specific intervention context. It remains essential to organize field surveys that will allow exchanges with local actors and inhabitants on the constraints and potentials of territories in terms of access to land, lifestyles, material and human resources, practices, knowledge, and construction capacities.



TARGET AUDIENCE

Local, national, international, governmental, non-governmental and civil society actors involved in the prevention, preparedness, and response to humanitarian crises (disasters or conflicts) in the shelter, housing, and human settlements sectors.



HISTORY OF THE SERIES OF SRP

This publication is part of the series of documents “Local Building Cultures for sustainable and resilient habitats” that was launched in 2016. Several documents have been produced after a disaster (Fiji, Ecuador, Haiti) or before a disaster strikes as a preparedness tool (Bangladesh, Tonga, Malawi, Nepal). Most profiles have been elaborated for situations of both protracted crises and disaster contexts (Ethiopia, Democratic Republic of Congo, Burkina Faso, Yemen, Venezuela, Somalia, North-West Syria...).



SOMALIA PROFILE: INFORMATION, DATA COLLECTION AND PRODUCTION

This Profile was produced from September 2022 to January 2023. The process was codirected by CRAterre and Somalia Shelter Cluster and more than 20 people representing almost 20 Somali-based organizations have contributed to the process. Apart from local contributions, a dedicated literature review of more than 40 documents (see Sources consulted to produce this document) was achieved. The profile has been

revised by several international and Somali experts and shelter and housing actors in Somalia.

This document summarizes and disseminates strengths of local building cultures, including a variety of hazard-resistant practices; considerations about disaster prevention, risk reduction and mitigation measures; environmental impacts; knowledge and experience developed by local communities; etc. These aspects have been identified, analyzed and many of them validated over the years.

This document is intended to be a living one, and new contributions will be highly appreciated (please contact secretariat@craterre.org and Somalia Shelter Cluster coordination).

FOR MORE INFORMATION

SHELTER RESPONSE PROFILES

<https://www.sheltercluster.org/promoting-safer-building-working-group/library/shelter-response-profiles>

PARTICIPATORY ASSESSMENT OF LOCAL BUILDING CULTURES

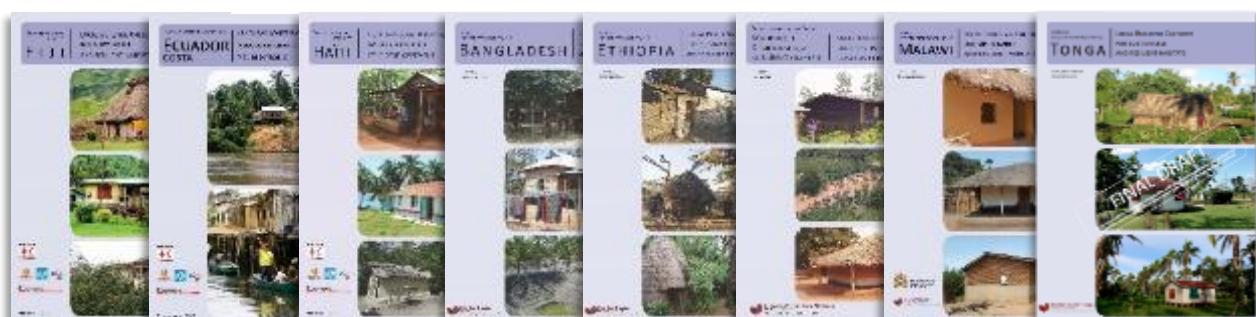
<https://sheltercluster.org/promoting-safer-building-working-group/library/understanding-context-forms-and-report-template>

SHELTER RESPONSE PROFILES

[Fiji](#)
[Ecuador \(Coast\)](#)
[Haiti](#)
[Bangladesh](#)
[Ethiopia](#)
[Democratic Republic of Congo \(South East\)](#)
[Malawi](#)
[Tonga](#)
[Burkina Faso](#)
[Yemen](#)
[Venezuela](#)
[Somalia](#)

TO BE RELEASED:

Nepal
Syria (North West)



Foreword

► HUMANITARIAN CONTEXT AND HIGH VULNERABILITIES

Somalia's prolonged humanitarian crisis is characterized by ongoing conflicts, climate-related shocks, communicable disease outbreaks and weak social protection mechanisms, insecurity, and access. The situation remains extremely serious and humanitarian assistance must be sustained over time and improved.

4.8 million people are estimated to need shelter and NFI assistance in Somalia in 2023, mainly due to the conflict and disasters-related displacements, poor shelter conditions, overcrowding, poverty, and a lack of security of tenure. IDPs have been displaced on average for more than seven years.

International human rights law and a dozen of international binding texts recognize everyone's right to an adequate standard of living, including adequate housing. This right entails affordability, accessibility, cultural adequacy, safety, privacy, land tenure security and protection against forced eviction, access to basic services such as water and sanitation.

► THE SHELTER SECTOR RESPONSE

An important part of the shelter response focuses on the provision of emergency shelters and Non-Food Items (NFI) which give displaced families immediate relief and protection. Emergency shelters are a temporary housing solution because of the short lifespan of the construction materials and because they do not provide enough safety, privacy, and dignity for IDPs.

Considering that emergency shelters are a temporary solution, and the average displacement period is more than seven years, the Shelter Cluster in Somalia is encouraging all stakeholders to scale up and enhance the response through greater focus on transitional and durable shelter solutions delivered through owner-driven, area-based approaches that empower affected communities. The provision of adequate shelter provides an enabling platform for advocacy with local government entities for the increase in access to secure land ownership for IDPs, and increased potential for the integration of displaced persons among hosting communities.

Transitional or durable shelters improve the living conditions of IDPs as well as their physical and mental health. They protect against the elements and improve safety, especially

with regards to women and girls who are more at risk of forms of gender-based violence, including sexual exploitation and abuse. The construction of durable shelters also has a positive impact on the local economy as they require materials produced locally and they increase livelihood opportunities for affected populations.

► ADAPTED LOCAL BUILDING CULTURES

Shelter Cluster members have been implementing different shelter solutions based on local practices and vernacular architecture. One of the good examples is the *baraako*, permanent house made with strurdy branches buffered by a continuum of bundles of thin twigs intertwined and sometimes plastered with mud and termite soil. However, this solution cannot be implemented everywhere as the construction materials are not always locally available.

Partners have also implemented housing projects with construction techniques that are used in urban areas such as concrete block walls. However, most of IDPs cannot afford cement and therefore cannot build such houses. Humanitarian and development organizations have also very limited resources which make this solution impossible to implement on large scale. Concrete blocks have a also a very negative impact on climate change due to the high level of CO2 emission to produce cement and to transport it to Somalia.

Therefore, to address both housing needs for IDPs and climate change challenges, the Shelter/NFI cluster continues to explore greener and contextualized solutions. The Shelter Response Profile is providing a comprehensive analysis of the shelter and housing construction practices that will inform all humanitarian and development actors implementing transitional or durable shelter projects.

In the mean time, several organisations are doing research on environmentally friendly and culturally appropriate local construction techniques, materials and approaches. This research includes piloting new shelter solutions using locally produced materials and construction techniques. Lessons learned from this pilot will inform the cluster's development of a guidance towards a greener shelter response.

Table of content

Foreword	4
[1] Introduction	6
[2] Country profile	8
2.1. General description	8
2.2. Key demographic, cultural, social and economic data	9
2.3. Natural hazards	11
2.4. Environment and climate change impacts	13
2.5. Humanitarian crisis and shelter sector response	14
[3] Access to land, housing, and basic services	16
3.1. Overview of access to land and housing	16
3.2. Access to water, sanitation, and basic services	18
[4] Description of local housing and settlements	20
4.1. Households' description	20
4.2. Settlements	20
4.3. Cultural aspects in housing	22
4.4. Local affordable construction types	26
4.5. Construction materials	35
4.6. Organization of construction	41
[5] Analysis of local building cultures	42
5.1. Lifespan, maintenance and adaptation	42
5.2. Bioclimatic comfort	43
5.3. Environmental issues	45
5.4. Hazard-resistant practices	47
5.5. Inclusion: gender and disabilities	49
5.6. Health and hygiene issues related to housing	51
5.7. Use and aesthetics	52
5.8. Economic aspects	53
5.9. Socio-cultural practices that promote resilience	54
5.10. Improvable building practices and recommendations	55
[6] Typologies responding to the humanitarian crisis	59
6.1. Emergency shelter solutions	59
6.2. Transitional shelter solutions	60
6.3. Permanent shelter solutions	63
[7] Conclusions: key points	65
[8] Additional resources and bibliography	68
8.1. Key concepts	68
8.2. Sources consulted to produce this document	69
Acknowledgements	72

6 INTRODUCTION

[1] Introduction



WHY LOCAL BUILDING CULTURES¹ ARE IMPORTANT TODAY

All over the world, societies have managed to produce, adapt and develop their habitat according to their needs, interests, aspirations, preferences, availability, affordability and abilities, making the best use of locally available materials. Strategies developed take advantage of natural resources to protect against the destructive forces of nature and have always generated rich and varied knowledges at local levels.

(Re)discovering the intelligence of local architectures and analyzing their associated practices is often very useful in the process of designing disaster-resistant architectures in line with build-back-safer principles, but also to adapt to contemporary lifestyles and their evolution, respect the local environment and culture and conform to the technical and economic capacities of local populations.

Relying on, or at least getting inspiration from local knowledge, know-how, construction processes, and traditional means of organization has proven to be very effective, as it favors:

- The implementation of solutions well adapted to local ways of life and the suggestion of viable improvements.
- The possibility to shelter many people quickly and cost-effectively while considering seasonality effects as well as factors like religious festivals and livelihood activities.

- Large-scale reproducibility of the improvements designed in continuity with local building cultures and an easy access, both financially and technically, to the promoted solutions for non-beneficiaries.
- A positive impact on local economies as local skills and materials are fully promoted while also considering environmental concerns linked to the construction industry.
- Extensive short and long-term ownership by the beneficiaries through their participation in decision-making and project implementation processes.
- Empowerment of local populations through the recognition of the value of their existing capacities for building and the improvement of their resilience.

To develop a disaster-resistant architecture adapted to the local lifestyle, it is crucial to involve the beneficiaries, the local professionals, and decision-makers from the very beginning of the recovery phase. Also, rebuilding is often necessary and can be very demonstrative and convincing; therefore, promoting appropriate repairs, when possible, may help achieve this goal. This way, the link between relief, recovery and development is enabled, so the long-term benefit of a shelter project is ensured. In addition to the supply of shelters, the project will have a higher level of resilience.



View of Habo, Puntland – CC Faaris Adam

¹ Key terms are defined in Section [Key concepts](#) (page 68)



ARTICULATION WITH THE SOMALIA SHELTER CLUSTER STRATEGY

The production of this document is aligned with the Shelter Cluster strategy in Somalia. According to the Somalia Shelter Cluster strategy (Shelter Cluster Somalia, 2019) “IDPs in protracted situations will be provided assistance to improve, repair or upgrade their shelter and settlements’ living conditions, through provision of support for **transitional shelter solutions and settlement** (re-) planning, especially those that suffer from overcrowding, and which face the risk of fire and disease outbreaks”. “The cluster will undertake a permanent shelter standardization process where partners in each region will agree on standard shelter designs that are **cost-effective, culturally acceptable, and suited to the prevailing climatic conditions**. Linkages will be established **with development partners** to create complementarities.” (Shelter Cluster Somalia, 2019).

Also In a recent Shelter Cluster document (Koclejda et al, 2022), the following statements are found: “considering that emergency shelters are a temporary solution, and the average displacement period is more than seven years, the Shelter Cluster in Somalia is encouraging all stakeholders to scale up and enhance the response through greater focus on **transitional and durable shelter solutions delivered through owner-driven, area-based approaches that empower affected communities**. The provision of adequate

shelter provides an enabling platform for advocacy with local government entities for the increase in access to secure land ownership for IDPs, and increased potential for the integration of displaced persons among hosting communities”. And continues: “transitional or durable shelters **improve the living conditions** of IDPs as well as their physical and mental health. They **protect against the elements and improve safety**, especially with regards to women and girls who are more at risk of forms of gender-based violence, including sexual exploitation and abuse. The construction of durable shelters also has a **positive impact on the local economy** as they require materials produced locally and they increase livelihood opportunities for affected populations”.

↳ FOR MORE INFORMATION

SHELTER CLUSTER SOMALIA. (2019). *SOMALIA SHELTER CLUSTER STRATEGY 2019*.

https://sheltercluster.s3.eu-central-1.amazonaws.com/public/docs/somalia_shelter_cluster_strategy - 2019 .pdf

KOCLEJDA, A., ET AL. (2022). *DIGNIFIED AND SAFER LIVING CONDITIONS FOR IDPS IN SOMALIA*. SHELTER CLUSTER.

<https://sheltercluster.org/somalia/documents/dignified-and-safer-living-conditions-idps>



Self-built demountable shelter (*buul*), first response by households with little external support (Doolow, Jubaland) – CC - Enrique Sevillano Gutiérrez - CRAterre



Women fetching water in an IDP camp, Doolow, Jubaland – CC – Enrique Sevillano Gutiérrez, CRAterre

[2] Country profile

2.1. GENERAL DESCRIPTION

► LOCATION, PHYSICAL AND TOPOGRAPHICAL DATA

Somalia is a country situated along the Coast in the Horn of Africa and has the longest coast in the continent, with the Red Sea to the North and the Indian Ocean to the East (Lewis et al, 2009).

Most of the country is formed by plateaus, highlands, and plains (Said, 2019). The exception is placed in the North, the Karkaar Mountains. They go from the Northwest border to Cape Guardafui or Raas Caseyr in the Northeast. The country has two permanent rivers flowing from Ethiopia: Juba and Shabelle (Said, 2019).



CC Wikipedia Commons



► CLIMATE

Somalia has four seasons (Basnyat, 2007): *Jilaal* is the dry and hot season (December to March); *Gu*: is the major rainy season (April to June); *Hagaa* is the dry and cool season (July to September); and *Deyr* is the minor wet season (October to November).

Precipitation is generally low and torrential: average annual rainfall is about 200 mm in most parts of the country, with only up to 50 mm in the northern coastline and from 400 to 600 in the southwest (Climate Change Knowledge Portal).

Due to these climatic characteristics, there is an arid-adapted flora in the country, including species of *Acacia* and *Commiphora*, forming bushlands of 3 to 5 m tall with scattered emergent trees up to 9 m, with *Euphorbia* and *Aloe* variants forming understory (World Bank, 2020).

Official name: Federal Republic of Somalia (English) / Jamhuuriyadda Federaalka Soomaaliya (Somali) / الفيدرالية الصومالية (Arabic)

Capital: Mogadishu

Total land: 627,340 km²

Coastline: 3,333 km

Lowest point: 0 m (Red Sea and Indian Ocean)

Highest point: 2.460 m (Mount Shimbiris, in the North)

Neighboring countries: Djibouti (Northwest), Ethiopia (West), and Kenya (Southwest)

Major cities: Mogadishu, Hargeysa, Berbera, Kismaayo, Marka, Jamaame, Baiodoa, Gaalkacyo, Boosaaso, Garoowe

Protected Areas: there are 12 National Parks and 9 Wildlife Reserves (UNEP-WCMC, 2022)

Data from: United Nations, CIA World Factbook, World Population Review, World Bank, UNESCO, Said (2019), World Bank (2020)



Informal urban growth in Hargeisa, Somaliland – CC - Najeeb

2.2. KEY DEMOGRAPHIC, CULTURAL, SOCIAL AND ECONOMIC DATA

► LANGUAGES

Somali (official) and Arabic (official). Somali is spoken by most people as first language. Arabic is spoken by many people as a second language, while English, taught in schools, is the third language (Said, 2019).

► URBANIZATION

Somalia has one of the highest urbanization rates in the region with at least 47% of the population settled in cities. According to UN-Habitat increased rates of displacement and returns seeking services into cities contribute to scale of needs and challenges through overstretching the existing infrastructure and inadequate housing.

► EDUCATION

Expected years of schooling: 1.72 years (female 1.48 years and male 1.95 years) (UNESCO, 2020).

Percentage of children of primary school age (ages 6-11) out of school: 79% (female 81%, male 77%) (EPDC, 2006).

Percentage of children of secondary school age (ages 14-17) out of school: 72% (female 79%, male 66%) (EPDC, 2006).

Adult literacy rate, population 15+ years, both sexes (%) (USAID): 5.4%.

Youth literacy rate, population 15-24 years, both sexes (%) (USAID): 13.14%

Education expenditure (% of government expenditure) (USAID): 4.41%

► HEALTH

Maternal mortality ratio (CIA W F): 829 deaths/100,000 live births (2017 est.)

Infant mortality rate: 86.53 deaths /1000 live births (2022 est.)

Physicians' density (CIA W F): 0.02 physicians/ 1,000 inhabitants

Hospital beds per inhabitant (CIA W F): 9 beds per 1,000 residents.

Major infectious diseases (very high degree of risk, 2020) (CIA W F): food or waterborne diseases (bacterial and protozoal diarrhea, hepatitis A and E, and typhoid fever); vector borne diseases (dengue fever, malaria, and Rift Valley fever); water contact diseases (schistosomiasis); animal contact diseases (rabies). Moreover, rates of measles outbreaks have increased because of overcrowded living conditions (MSF).

► GENDER

↳ **Gender Inequality index: 0.776 (1 denoting complete inequality), placing Somalia at the 4th highest position in gender inequality globally (UNDP, 2022)**

Somalia has extremely high maternal mortality, rape, female genital mutilation and child marriage rates; common violence against women and girls; minimal participation of women in politics and decision-making, which perpetuates limited female roles and inequality (World Bank, 2020).

Population: 17,597,511
(estimated, July 2022, UN)

Population density: 28/km²
(2022)

Age structure (2020 est.):

- 0-14 years: 42.38%
- 15-24 years: 19.81%
- 25-54 years: 30.93%
- 55-64 years: 4.61%
- 65 years and over: 2.27%

Poverty rate: 69% of Somalis living below the poverty line (National Development Plan 2017-2019) (World Bank, 2020)

Population growth: 2.42% (2022)

Religion: Islam (Sunni)

Life expectancy: 55.72 years global; 53.39 years male; 58.12 years female (2022 est.)

Median age: 18.5 years (2020)

Fertility rate: 5.31 children per woman (2022 est.)

Data from: United Nations, CIA World Factbook, World Population Review, World Bank, UNESCO, Said (2019), World Bank (2020)



Somali boys sit in class in Ceel Baraf, Hirshabelle – CC - AMISOM



Gender inequality is an important challenge in Somalia. Woman in Abdalla Birolle Village, Jubaland – CC - AMISOM

10 COUNTRY PROFILE

57 percent of the workforce in agriculture and pastoralism (70 percent of the local economy) is represented by women, who are also involved in trading and commerce, while they represent only 19 percent of the workforce in government departments and 36 percent of pupils in the upper primary education (World Bank, 2020).

► ECONOMY

↳ Somalia is one of the poorest countries in the World (in 2016, 51% of the population lived on less than US\$1.9 a day)

For the past more than 30 years, Somalia has been in situations of protracted conflict and humanitarian crisis affecting its economy (World Bank, 2020).

Somalia maintains an informal economy largely based on livestock, remittance/money transfer companies, and telecommunications (CIA World Factbook). Agriculture is the most important sector, with livestock accounting for about 40% of GDP and more than 50% of export earnings. Nomads and semi-pastoralists constitute a large portion of the population (CIA World Factbook). Apart from herders, some Somalis are fishermen or farmers (Lewis et al, 2009) and some others do commerce (World Bank, 2020). Most Somalis rely on rainfall for their nomadic agriculture activities. Maize and sorghum are grown locally, and rice and wheat are almost entirely imported (World Bank, 2020).

The country is the world's fourth-most remittance dependent one, which makes up about 20-50 percent of local economy (World Bank, 2020).

► CULTURE AND HABITS

Keer: unwritten social contract between Somali kinship groups system specifying rules, orders and compensations for injuries and damages, and dictating future relations between two conflicting parties (Mambo, 2014). **Keer** helps minimize conflict between communities and aims at mutual dependence and reciprocity between the two parties (Mambo, 2014).

Qaaraan: clan based sharing of wealth, thanks to which everyone can get finance to marry, organize a funeral, have health care, or get damaged property back (Mambo, 2014; Said, 2019).

Shir: democratic and consensus-driven community forum to make decisions, where a majority opinion is necessary to obtain a verdict on any issue and consensus is mobilized (Mambo, 2014). The **shir** is held under the biggest tree, where everyone (men) sits in a circle and the last decision is made about the specific issue (Said, 2019).

► INFORMATION AND COMMUNICATION

Telephones - mobile cellular (CIA World Factbook): 48.8% of the population (2019)

Internet users (CIA World Factbook): 2% of the population (2019 est.)

Broadcast media. TV: Not many Somalis have access to TV. The country has public and private networks. **Radio:** public and private radio stations are the main way that people get information and news in Somalia (Media Landscapes).

► TRANSPORT

Roadways: total km 15,000 km (CIA World Factbook)

↳ ECONOMY

Currency unit: Somali shilling, with common use of USD and neighboring countries currencies (Kenyan shilling and Ethiopian birr)

Real GDP (purchasing power parity): \$13.19 billion (2020 est.)

Real GDP growth rate: 2.3% (2017 est.)

Real GDP per capita: \$800 (2020 est.)

GDP - composition, by sector of origin: agriculture: 60.2%; industry: 7.4%; services: 32.5% (2013 est.)

Agricultural products: camel milk, milk, sheep milk, goat milk, sugar cane, fruit, sorghum, cassava, vegetables, maize

Industries: light industries, including sugar refining, textiles, wireless communication

Labor force: 4.154 million (2016 est.)

Labor force - by occupation: agriculture: 71% / industry: 29%

Data: CIA World Factbook

↳ TO FIND OUT MORE

WORLDBANK

<https://data.worldbank.org/country/SO>

UNDP

<https://www.undp.org/somalia>

OCHA

<https://www.unocha.org/somalia>

UNHABITAT

<https://unhabitat.org/somalia>

CIA WORLD FACTBOOK

<https://www.cia.gov/the-world-factbook/countries/somalia/>

CULTURE ATLAS

<https://culturalatlas.sbs.com.au/somali-culture/somali-culture-core-concepts>

2.3. NATURAL HAZARDS

↳ Somalia is prone to several natural hazards, particularly floods and drought (World Bank).

- FLOOD**
- DROUGHT**
- EXTREME HEAT**
- CYCLONE**
- LANDSLIDE**
- EROSION**
- WILDFIRE**
- EARTHQUAKE**
- TSUNAMI**
- PEST INFESTATIONS**
- LIVESTOCK DISEASE**

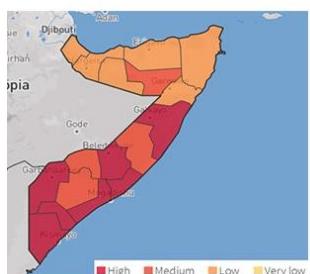
► FLOOD

During the rainy seasons, areas can be inundated when runoff from upland areas and heavy rainfall combines to exceed the capacity of seasonal or permanent riverbeds (FSNAU & FEWS NET, 2016).

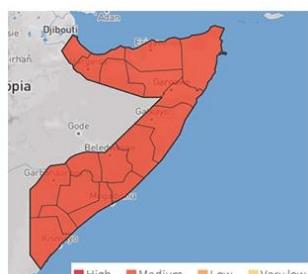
Flash floods are difficult to predict and generally occur when heavy rains cause large volumes of water to flow into dried-up riverbeds called *wadis*. In recent years, the effects of the floods have increased. The lower Jubba and lower Shabelle regions are particularly vulnerable to flash floods. In addition, excess water that runs down from the two rivers also causes massive flooding for the communities in the two river valleys.

► DROUGHT

Since the 1960s, several severe droughts have contributed to the unsustainable use of already limited water availabilities (World Bank, 2020). The present drought (2022) cannot be seen in isolation, as all countries in the Horn of Africa are negatively impacted by the four consecutive seasons of below



Flood hazard



Drought hazard

average rainfall, with Somalia most severely affected (UN-OCHA, 2022). In 30 years, Somalia went through eight major droughts that have caused massive human and economic losses and impacted the environment, specifically vegetation growth (World Bank, 2020).

Droughts cause negative effects (FSNAU & FEWS NET, 2016):

- in pastoral and agropastoral zones, they include poor range conditions, weakened animals, reduced milk production, low prices for livestock and high terms of trade. All the previous aspects create food shortage;
- in agricultural and agropastoral areas drought causes reductions in crop yields, which lowers demand for agricultural labor and decreases the amount available for local consumption, as well as for gifts (*zakat*), and finally there is also an increase in staple food prices.

► EXTREME HEAT

Extreme heat hazard is classified as high, which means that prolonged exposure to extreme heat, resulting in heat stress, is expected to occur at least once in the next five years (Think Hazard! 2022).

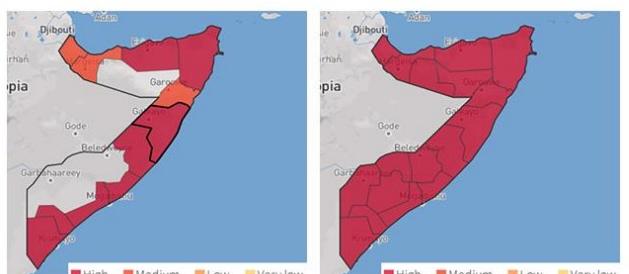
► CYCLONE

Cyclone hazard is classified as low, which means that there is a 1% chance of potentially damaging wind speeds in your project area in the next 10 years, particularly in Somaliland, Puntland and Galmudug coastal areas (Think Hazard! 2022).

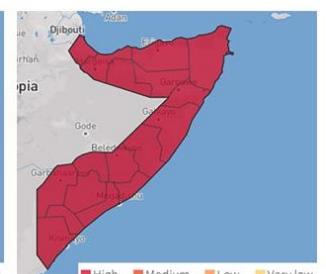
Tropical storms, such as Tropical Cyclone 3 that hit parts of Somalia in November 2013, can lead to flash floods and the loss of equipment and property (FSNAU & FEWS NET, 2016).

► LANDSLIDE

Landslide susceptibility is classified as high (Puntland) and medium or low (Somaliland), while it is very low in the rest of the country. In high susceptibility areas rainfall patterns, terrain slope, geology, soil, land cover and earthquakes make landslides a frequent hazard (Think Hazard! 2022).



Coastal flood hazard



Wildfire hazard (Think Hazard! 2022)

12 COUNTRY PROFILE

► EROSION

There is heavy degradation of soil capital. For instance, Puntland soils suffer from extreme degradation to an extent that soil erosion, sand dunes and massive gullies now affect 148,000 km² (or 70% of the landscape, with 50% of the land being severely affected) (World Bank, 2020).

► WILDFIRE

The wildfire hazard is classified as high, which means that there is greater than a 50% chance of encountering a significant wildfire that is likely to result in both life and property loss in any given year (Think Hazard! 2022).

► EARTHQUAKE

Earthquake hazard is classified as medium in most of Somaliland and low or very low in the rest of the country. Medium earthquake hazard means that there is a 10% chance of potentially damaging earthquake shaking Somaliland in the next 50 years (Think Hazard! 2022).

► TSUNAMI

Tsunami hazard is classified as medium, which means that there is more than a 10% chance of a potentially damaging tsunami occurring in the next 50 years in most coastal areas of the country (Think Hazard! 2022).

► PEST INFESTATIONS

Crop diseases and pests including bird and insect infestations are associated with wet years, and periodically cause significant crop losses (FSNAU & FEWS NET, 2016).

► LIVESTOCK DISEASE

Several diseases are present among livestock leading occasionally to disease outbreaks which can lead to significant rises in livestock mortalities, increase of prices and reduction of market access (FSNAU & FEWS NET, 2016).



Floods in Jowhar, Hirshabelle State – CC – UN Photo, Tobin Jones

DISASTER RISK REDUCTION MECHANISMS (DRR)

The Department of Disaster Risk Management under the Ministry of Humanitarian Affairs and Disaster Management (<https://sodma.gov.so/>), oversees DRR in Somalia.

A National Platform for Disaster Risk Reduction exists since 2021 (UNDRR). The NPDRR brings together various stakeholders responsible for facilitating disaster risk reduction efforts in the country and operates at two levels (UNDRR):

- a ministerial steering committee led by the Ministry of Humanitarian Affairs and Disaster Management as chair and the Ministry of Agriculture and Irrigation (MOAI) as co-chair,
- and technical working groups to ensure coordination among stakeholders as well as a coherence for the implementation of the technical agendas to support the DRR mandate.

According to [Climate Laws](#), there is a National Disaster Management Policy since 2018 (no further documentation is available). Disaster preparedness and management is part of the Updated Nationally Determined Contribution (The Federal Republic of Somalia, 2021b), willing to establish effective early warning systems and disaster risk management policies to improve resilience to extreme weather events, establish meteorological networks to enhance early warning systems, increase resilience of communities, infrastructures and ecosystems to droughts and floods, among other objectives.



Drought is a major challenge in Somalia. Ceel Dheer, Galmudug – CC – ICRC

2.4. ENVIRONMENT AND CLIMATE CHANGE IMPACTS

↳ Water scarcity; contaminated water contributing to human health problems; improper waste disposal; deforestation; land degradation; overgrazing; soil erosion; and desertification are some of the most important current environmental issues in Somalia (CIA World Factbook).

► CLIMATIC PERTURBATIONS AND SHOCKS

Somalia experiences effects of rising average temperature exacerbated by the implications from degraded lands and deforestation, whose most severe consequences are droughts (World Bank, 2020).

Changes in climate have led to greater uncertainties in seasonal rainfall levels (World Bank, 2020).

In fact, Somalia is the 2nd most climate change vulnerable country according to [ND-GAIN Matrix](#). Human-caused climate change is increasingly being linked to the duration and severity of the recent and current droughts. With the global and regional warming of the last century, Somalia has become arid at a rate unprecedented in the last 2,000 years.

► WATER SCARCITY

Environmental degradation is particularly associated with the problems of drought and water scarcity, and coping with these hazards has become a vicious cycle as these problems lead to solutions that have negative consequences and create additional hazards (FSNAU & FEWS NET, 2016):

- the spread of private *berkads* (sort of water pits) has helped create all-season grazing in some areas, but has also contributed to long-term environmental degradation,
- water trucking in arid soils has had consequences on the land such as gully erosion.



Women fetching water in Qoryooley, South West State - CC – UN Photo
Tobin Jones

► NATURAL RESOURCES UNSUSTAINABLE EXTRACTION

Natural resources are sometimes extracted unsustainably, and regeneration potentials are in those cases eradicated due to (World Bank, 2020 / FSNAU & FEWS NET, 2016):

- commercial land use practices, such as timber and charcoal production,
- soil depletion through overharvesting,
- illegal overfishing and toxic waste dumping by foreign companies have put the environment, households and livelihoods at risk in coastal zones,
- pressure on land, historic and present land degradation due to environment and violence-related conflicts such as farming versus pastoralism,
- increasing populations and food insecurity, paired with internal displacement contributing to this trend.

► DEFORESTATION

Vulnerability to climatic extremes together with drought events create deforestation. In fact, the country lost about 686,000 ha of forest between 2000 and 2017 (annual loss of 40,000 ha), which is equivalent to 205 million trees (World Bank, 2020).

A common practice which has accelerated environmental degradation and deforestation is charcoal production for sale to cope with reduced income during hard times (World Bank, 2020 / FSNAU & FEWS NET, 2016).



Wood for sale at Eyl, Puntland – CC – Heimo Liendl

2.5. HUMANITARIAN CRISIS AND SHELTER SECTOR RESPONSE

↳ Somalia holds the second place on the Fragile States Index (2022) and it has a huge population which needs humanitarian aid due to ongoing conflict and acute drought. Approximately 8.3 million people across Somalia are expected to face crisis (IPC Phase 3) or worse acute food insecurity outcomes between April and June 2023 (IPC Analysis, Oct 22 to June 23).

► CONFLICT AND INSECURITY

During more than 30 years the situation in Somalia has been determined by civil war, violent internal divisions (clan-based competition for resources) and fighting between extremist groups and the Federal Government of Somalia forces supported by the African Union Mission in Somalia (CIA World Factbook; FSNAU & FEWS NET 2016; World Bank, 2020).

Civil insecurity and market closures are a reality, especially in southern and central parts of Somalia, while some stability has returned to the north (FSNAU & FEWS NET, 2016).

► EXTREME POVERTY

With over half of population living in poverty, Somalia ranks as one of the world's poorest countries. Poverty tends to be higher among rural and IDP households as well as households without remittances from Somali diaspora (World Bank, 2020).

► FOOD INSECURITY

Food insecurity is a major problem due to increasing climatic variability and rainfall uncertainties (World Bank, 2020) that come in addition to the conflict situation. In fact, fighting restricts the movement of people, and flow of food, livestock, and other basic items, increasing food prices and the cost of living (FSNAU & FEWS NET, 2016). Additionally, problems with shipping (piracy and high seas) and limited transport in the more remote areas also influence food prices and food availability (FSNAU & FEWS NET, 2016).

Over 7.1 million people (45 per cent of the total population), experienced high levels of acute food insecurity in June 2022 with extraordinary impact in children (UN-OCHA, 2022).

► DISPLACEMENT

From 2016 to 2022, there have been an estimated 7,115,000 displacements in the country, with 1.8 million people displaced in 2022 alone ([PRMN, 2022](#)). Among displacements occurred in 2022 1.18 million were due to the drought and 0.6 million

were due to conflict ([PRMN, 2022](#)). It is one of the highest levels of internal displacement globally with women and children constituting most of this group (UN-OCHA, 2022).

Displaced populations predominantly reside in over 3,340 highly congested informal settlements (IDP sites) mainly in the outskirts of Mogadishu, Baidoa, Gaalkacyo, Beletweyne, Bossaso, Kismaayo and Burao, where access to safe water, sanitation and services is compromised ([CCCM dashboard 2022](#)). Displacement to neighboring regions within Somalia or Kenya and Ethiopia is common (FSNAU & FEWS NET, 2016).

IDP settlements/sites are highly vulnerable to protection concerns, exploitation, aid diversion, evictions, and risk of GBV (Gender Based Violence) (UN-OCHA, 2022). Moreover, IDPs face precarious labor and living conditions, and as of April 2022, less than 30 per cent of newly arrived IDPs had received immediate assistance such as NFI items, food/cash support, and access to nutrition services (UN-OCHA, 2022).

► HUMANITARIAN RESPONSE IN SHELTER

The shelter cluster strategy has three main pillars: Shelter assistance, NFI assistance, and Provision of Community infrastructure. Crosscutting themes, accountability and community participation and ownership are underlying themes which are embedded in all activities. Where feasible, the shelter cluster looks for opportunities to scale up transaction-based modalities in activities where their introduction can increase the timeliness and appropriateness of the response (e.g. by enabling people to address their own needs and priorities), and where it can support the resilience and social cohesion of communities, for example by facilitating the purchase of supplies and services in local markets.

The overall objective of the shelter cluster is seeking dignified and safer living conditions for protracted IDPs, IDPs for drought displacement in Somalia, to improve their living conditions and resilience, and to contribute to durable solutions. To achieve this, the Shelter Cluster activities aims to provide (Koclejda et al, 2022):

- Safe, dignified and adequate shelter solutions for vulnerable and protracted IDPs, including safe access to water and sanitation;
- More transitional and durable shelter solutions that do not need to be replaced every year;
- Security of tenure for IDPs and prevention of evictions that regularly affect IDPs;
- More cost-effective and affordable shelter solutions.

► TYPOLOGIES RESPONDING TO THE HUMANTARIAN CRISIS

There are three types of shelter according to most classifications used by the humanitarian sector in Somalia (Shelter Cluster Somalia, 2022; Shelter Cluster Somalia, 2016e):

> **Emergency shelter (*Hoy degdeg ah*):** emergency shelters are habitable covered living spaces providing a secure and healthy environment with privacy and dignity. They provide a short-term solution to accommodate disaster, conflict or displacement affected people.

Emergency shelter solutions in Somalia include: **Tent (*teendho*), Emergency Shelter Kits (ESK), and Timber and plastic sheet with CGI roof.** *Buul (buush)*, and self-built shelters with recycled materials such as CGI could also make part of this category, but they are included in the section [Makeshift typologies](#).

> **Transitional shelter (*Hoy Kumeel gaar ah*):** Transitional shelter (T-Shelter) is an incremental process rather than a multi-phased approach, where the shelter is built using local materials and/or salvaged materials when possible. In theory, transitional shelters can be upgraded into part of a permanent house; reused for another purpose; relocated from a temporary site to a permanent location; resold to generate income to aid with recovery; recycled for reconstruction.

The design often incorporates a permanent foundation and an upper structure where materials can be re-used for internal walling and roof ceilings in the final house.

Transitional shelter solutions include: ***Mundul, Baraako, CGI walls and roof houses, Refugee housing unit, and Hybrid (Darbiga plywood oo leh saqafka CGI).*** *Baraako* shelter solutions are supported by the humanitarian sector, and they have particularly addressed in the section about [Vernacular architecture](#).

> **Durable - permanent shelter (*Hoy waara*):** These approaches happen when people affected by humanitarian crises are supported to reach so considered durable shelter solutions. These solutions include: **houses with CSEB and adobe walls with CGI roof, and houses with stone or cement blocks walls and CGI roof (*Derbiga Stone / bulukeeti saqafka CGI*).**

↳ TO FIND OUT MORE

SHELTER CLUSTER SOMALIA. (2022). SHELTER TYPES

https://sheltercluster.s3.eu-central-1.amazonaws.com/public/docs/shelter_types_somalia_2022-01-18.pdf



Transitional CGI shelter – CC – Enrique Sevillano Gutiérrez - CRAterre



Baraako Transitional shelter – © Shelter Cluster Somalia

[3] Access to land, housing, and basic services

3.1. OVERVIEW OF ACCESS TO LAND AND HOUSING

► TYPES OF LAND TENURE

Broadly speaking the types of tenure in Somalia include (Land Portal): Private Customary Tenure, Private Freehold, Private Leasehold, Public or State Land, and Urban Land Tenure.

Most land in Somalia is privately owned and dominant clans control it and are often hesitant or unwilling to sell land to outsiders or members of other clans (Shelter Cluster Somalia, 2016c). Limited access to land and insecurity of land tenure are major obstacles to durable solutions for IDPs and represent a root problem that must be addressed to affect change (Shelter Cluster Somalia, 2016c). This happens especially in the major towns where land has high economic value. Rural-urban migration and growing urbanisation add their own complexity to the situation (Shelter Cluster Somalia, 2016c).

► WAYS OF ACCESS TO LAND AND HOUSING

According to Bonnet et al (2020) and to shelter cluster actors, currently the most common ways of access to and ownership of land and property are:

> **Land leasing:** it is informal as no law exists for land leases; anyone can buy land from legal owners or lease it from customary landlords of undocumented land.

> **Rental housing:** it is largely informal, and rules vary by location and transaction. For example, in Benadir, residents must provide an ID, a fee of US\$ 10 to the Benadir Regional Administration, a guarantor, and an upfront payment of one to three months' rent. The owners must present a legal deed.

> **Land and property purchases:** land can be purchased privately if the owner has a title deed. The sale is formal (with a notary, a guarantor and a witness) or informal (people draft the sale documents themselves and effect the sale/purchase in the presence of witnesses). Registry and cadastral records exist. They were held by the municipal authorities from the 1960s to 1991, but they are now in the possession of a diasporic Somali who charges a percentage fee for the verification of deeds.

The vast majority of displaced families are not in a position to buy land or property. Despite the general case, there are emerging practises of IDPs in some parts of the country pooling resources to purchase land to prevent forced evictions. However, there are key challenges with fraudulent land transactions and limited access to land as IDPs are purchasing very small plots of land, which increases the risk of sprawling of unplanned and chaotic settlements (NRC 2021).

> **Inheritance:** formal courts certify deed documents to inherited land. Informal transfers exist and are done by handing over property to family members in the presence of adult members of the same family.

> **Informal settlements:** an approximate 85% of the IDP sites are informal settlements on private land and about 90% of them are in urban areas according to the Detailed Site Assessment (DSA) of the CCCM Cluster. The most common land tenure arrangement involves IDPs reaching agreements with local landowners for large pieces of land, where multiple families would construct their shelters. These agreements can be verbal or in writing, though when the agreement is verbal



Displaced people near Jowhar, Hirshabelle – CC – UN Photo Tobin Jones



Evicted displaced families reconstruct their *buul*, Doolow, Jubaland – CC – Enrique Sevillano Gutiérrez, CRAterre

only, the risk of eviction increases. The use of land could either be free or for some agreed upon payment. The arrangement can be made with the landowner directly or with a “gatekeeper” who can collect rental payments and can exploit IDPs by taking a cut of any aid that is provided (NRC, 2021b).

> **Government Allocation of Public Land:** there have been some efforts by local authorities to find land that can be allocated for and given to IDPs, usually by granting them title to the land they have been occupying. These land allocations have had mixed results, with some limited success reported in South West state, Puntland and Somaliland, but more difficult in Banadir region where land governance is weaker and there is more pressure on land due to high urbanization trends (NRC, 2021b). Generally, relocation initiatives, that are planned as mixed land use areas, with tenure security for the most vulnerable are golden – albeit rare – opportunities to shift from a camp to a neighborhood type of approach (Durable solutions working group, 2020). Cross collaboration between humanitarian and durable solutions partners have enabled partners and local authorities to interface with service providers and sector leads on topics related to relocation.

► EVICTIONS

Forced evictions pose key obstacles to attaining durable solutions: they violate human rights and constitute one of the most severe protection concerns for displaced people (NRC, 2021). The huge scale of forced evictions in Somalia is widely acknowledged, and the various causes and impacts of evictions have been identified (Protection Analysis Update, 2022). Since 2018, over one million forced evictions have been recorded in Somalia (HLP AoR/NRC eviction information portal).

Forced evictions are frequently associated with a lack of land tenure security when displaced populations settle spontaneously on largely private lands. Banadir region remains a hotspot for evictions in Somalia, representing over 75% of all cases since 2018 (Eviction information portal).

An analysis from 2021 on what happens to HLP assets after evictions indicates that 89% of evictions recorded in Somalia were carried out by private landlords due to owner-driven development, while 11% were carried out by the state for government-led development (NRC, 2021b). It further indicates that 58% of the IDP sites have created developments with new houses, buildings, roads, or shops constructed on the land. Out of this total, 56 IDP sites reported that new IDP households had settled on the same land post eviction. In some of the sites, several landowners constructed new shelters for rent, while in other sites the newly settled IDP

households were paying higher rental fees (NRC, 2021b). Further, a cost analysis undertaken in 2022, showed that over \$4.6 million in community and humanitarian infrastructure and investments was lost due to destruction of these assets. Consequently, such loss has undermined critical access to essential services such as water, sanitation, nutrition, health, housing, and education among others.

Despite these challenges, HLP partners have protected over 428,000 individuals from forced evictions since 2018 through eviction prevention. Actions include lobbying state institutions to issue temporary prohibitions or moratoriums; negotiating extension of notice periods and extended land tenure arrangements; facilitating dignified relocations; and advocating access to alternative dwellings with secure land tenure. Similarly, technical and material support to local municipalities in urban areas such as Mogadishu, Baidoa and Kismaayo has been provided to establish dedicated capacities to coordinate eviction prevention and response efforts.

► DISPLACED POPULATION

Land tenure is the most crucial part to give incentives to the relocated persons to invest in their own property, and without permanent land tenure, local integration will never be fully achieved (Shelter Cluster Somalia, 2016b). It is more than the permanent tenure of the plot where the house is placed, as the relocated population also needs to have access to the surrounding land for agriculture, for grazing land, and for local materials for construction (Shelter Cluster Somalia, 2016b).

Moreover, many IDPs lack rights to the city, inhabiting poorly located camps on the urban periphery, commonly with no access to infrastructure and basic services (Land Portal).

Gatekeepers in IDP sites play a prominent role both positive and negative (The Somalia Cash Consortium, 2013):

- Positive: they provide a place for IDPs to settle; advocate for delivery of services and assistance to IDPs; and provide some form of security within the IDP sites.
- Negative: they tax and forcibly acquire assistance provided; restrict IDP movement; restrict returnees willing to go back to their places of origin; abuse IDPs (rape or beatings, especially of women).

Strategies and policies regarding Displacement and land tenure in Somalia include (Koclejda et al, 2022):

- **The National Durable Solutions Strategy 2020 – 2024:** its first objective is to “increase the resilience of displacement affected communities by ensuring equitable access to public services, housing with security of tenure, and social safety nets through a rights and needs based approach”.

18 ACCESS TO LAND, HOUSING, AND BASIC SERVICES

- **Policy Framework on Displacement within Somalia:** Article 6 of the Policy provides “The Federal Government of Somalia commits to gradually upgrade living conditions of internally displaced persons in situations of protracted displacement and pending a long-term solution in order to avoid a manifestation of a dependency”.

► FINANCIAL CHALLENGES

Banks and a few real estate developers provide housing finance. However, heavy requirements put financing beyond the reach of the majority: only 15 per cent of the population have accounts with formal Banks, borrowers are required to raise 20–30 per cent of the value of a property as a down payment, to have a guarantor, to show identification, to proof a regular income, etc. (Bonnet et al, 2020).

In the facts, vulnerable groups may borrow small sums from friends or relatives, sometimes in the form of remittances from other parts of the country or abroad (Bonnet et al, 2020). Also, there are community saving groups called *Ayuuto* (chapter 5).

► GENDER AND ACCESS TO LAND / HOUSING

The different legal texts in the country affirm women’s right to equality before the law, the right to life and dignity, the right to be free from discrimination, and the right to own property (Koclejda et al, 2022). In the facts, these rights are not always respected: chronic poverty, social upheaval and patriarchal institutions make them difficult to realise (Land Portal).

↳ TO FIND OUT MORE

LAND PORTAL

<https://landportal.org/book/narratives/2021/somalia>

KOCLEJDA, A., ET AL. (2022). DIGNIFIED AND SAFER LIVING CONDITIONS FOR IDPS IN SOMALIA. SHELTER CLUSTER.

<https://sheltercluster.org/somalia/documents/dignified-and-safer-living-conditions-idps>

3.2. ACCESS TO WATER, SANITATION, AND BASIC SERVICES

↳ Nearly all districts in Somalia are in acute need of water, hygiene, and sanitation support (UN-OCHA, 2022). Water, sanitation, education, health, and livelihoods are crucial for full durable solutions (Shelter Cluster Somalia, 2016b).

► WATER



ACCESS TO AN IMPROVED WATER SOURCE (2022 EST.)

Only an estimated **31 per cent** (World Population Review, 2022) to **40 per cent** (UN-OCHA, 2022) of the population have access to improved water sources.

Most water systems are reliant on humanitarian assistance, and many primary water sources have stopped functioning, which means longer distances to travel and additional threats to safety and dignity, including GBV, as women and children are responsible for collecting water (UN-OCHA, 2022).

> **Surface water storage** (Basnyat, 2007): these storages basically collect storm runoff that occurs when rainfall has sufficient intensity, duration and areal extent. There are several types (for domestic use or sold to outsiders):

- **Balli:** small surface water harvesting ponds
- **Berkad:** underground reservoir, lined or un-lined, excavated to store surface runoff, used mainly in Hiran (Hirshabelle) and Gedo (Jubaland) regions for domestic storage and

constructed in areas where there are no dug wells. Where the water is sold, they are better maintained with fencing to keep off animals, and in some cases covered with shrubs or iron sheets to reduce evaporation.

- **Mugciid:** underground reservoir storage well with an average depth of 7 to 17 m and a diameter of 1 to 1.5 m, mainly present in the Bakool region (South West State). They are usually constructed in clusters, with each family owning two to three units, and water lasts for two to three months.
- **War:** unlined dug-out (dam), usually 2 to 3 m deep, common in the Bakool (South West), Bay (South West) and Hiraan (Hirshabelle) regions. Settlements can have two or three war. War and berkad are commonly used to collect surface water from small catchments of 2 to 3 km². War are more common in southern drainage basins because of the

↳ TO FIND OUT MORE

BASNYAT, D. B. (2007). WATER RESOURCES OF SOMALIA.

http://www.faoswalim.org/resources/site_files/W-11%20Water%20Resources%20of%20Somalia_0.pdf

favourable clayey soil for their construction. *War* sometimes have to be lined up with plastic sheets to prevent water loss through seepage. The sizes of *war* vary (from 1,500 to 50,000 m³) depending on the manpower available in the village for the construction. Water lasts for up to six months.

> **Groundwater** (Basnyat, 2007): it is harnessed by the rural and urban population to meet domestic and livestock water needs as well as for small scale irrigation and there are several types: shallow wells -hand-dug-; boreholes and springs; sub-surface dams; and infiltration galleries.

> **Trucked water**: trucked water may offer relatively safe water sources, but prices have risen considerably – up to 136 per cent (UN-OCHA, 2022).

> **Piped water**: it exists in cities such as Mogadishu.

► SANITATION



ACCESS TO AN IMPROVED SANITATION FACILITY (AFDB)

Populations with improved sanitation are estimated at a **24%, one of the lowest in the world**.

76% of the population do not have access to an improved sanitation facility. The prevalence of open defecation in rural areas is estimated at 56 percent (28 percent for the entire country), leading to a vicious cycle of illness as it pollutes water that people use for cooking, cleaning, and drinking (UNICEF & Borgen Project).

► ELECTRICITY

Electricity access (CIA World Factbook, 2019): Total population: 18% / Urban areas: 34% / Rural areas: 4%

Electricity generation sources (CIA World Factbook, 2020):

- Fossil fuels: 95.3% of total installed capacity
- Solar: 3% of total installed capacity
- Wind: 1.7% of total installed capacity



Surface water storage in Puntland State – CC – Phil Moore

Electricity is provided by a few private service providers, with BECO holding close to a monopoly, and with almost none of the informal settlement residents having access to the grid, as it is extremely expensive (Bonnet et al, 2020). Some informal settlements have access to solar-powered electricity, and many households use solar lamps at night (Bonnet et al, 2020).

► SOURCE OF ENERGY FOR COOKING

Only 3% of Somalis have access to clean energies and technologies for cooking (World Bank, 2020). Charcoal and firewood are the main sources of energy for cooking. Between 100,000 and 250,000 tons of charcoal are produced in Somalia: to produce this, up to 4.4 million mature trees are felled and 73,000 ha of land is cleared (World Bank, 2020).

► WASTE MANAGEMENT

Waste processing is generally self-managed. For example, the urban poor usually organize garbage disposal on their own by pooling resources, but for the most part, they burn their waste (impact on greenhouse gas emissions) (Bonnet et al, 2020).

A Case Study in Benadir Region (Shegow & Funwie, 2020) shows that there is a relationship between improper solid waste disposal and the occurrence of vector-borne disease such as cholera, typhoid and dysentery and malaria. The key factors resulting to poor solid waste management are poor infrastructure, lack of segregation, improper waste collection, insufficient dumpsites and financial constraints.

► ACCESS TO OTHER BASIC FACILITIES

Access to other basic facilities is generally very difficult. For instance, more than three million children are out of school as in many areas across the country parents are not able to fund their children's education (UNICEF).

Also, less than 30 percent of the population have access to health services (A Gele, 2020). One of the consequences is that 1 in 8 Somali children die before they turn five (UNICEF).



Shared latrine in IDP camp in Doolow, Jubaland – CC – Enrique Sevillano Gutiérrez, CRAterre

[4] Description of local housing and settlements

4.1. HOUSEHOLDS' DESCRIPTION

► TYPES OF RESIDENTIAL UNITS

> **Nuclear families:** The Somali domestic unit usually consists of a man, his wife or wives, and their children, with high prevalence of other members of the family living with them (Mambo, 2014; Countries and their cultures, n.d.a.).

> **Extended Families:** Living with extended families is usual, some examples of which are elderly, unmarried relatives or young adults who move to the city to study and live with relatives rather than alone (Mambo, 2014; Lewis et al, 2009). Parents, brothers, sisters and other relatives of both the husband or the wife can be part of an extended family.

> **Polygamous families:** This practice is not common in Somalia (<0.5% of individuals live in polygamous families according to the [Pew Research Center](#)). When this happens, each wife usually lives with her children in her own house, and the man divides his time among them (Countries and their cultures, n.d.a.).

4.2. SETTLEMENTS

The differentiation between urban and rural in Somalia historically had a limited value, as residence has been nomadic or seasonal for important parts of the population. Also, many environments are between both categories, partially rural and partially urban (UN-Habitat, 2021).

► RURAL AREAS

> **Nomadic settlements:** In ordinary times, three-fifths of the Somali population used to be nomadic pastoralists or agropastoralists (Encyclopaedia Britannica, 2022) living in tight family groups. During the dry seasons, herders move and concentrate in the river valleys of southern Somalia and around important water points all over the country (Janzen & Lewis, 2022). Some nomadic pastoralists usually have a fix place for the family compound and men with herd may move around except for in drought occasions where all the family will move.

A nomad camp may be surrounded by a fence made from thorn bushes, and animals are also kept in corrals made of the

► COMPOSITION OF HOUSEHOLDS

The average household size is around 6 persons, but it varies across population groups (World Bank Group, 2020):

- 7.6 persons in IDP households,
- 6.5 persons in nomadic households,
- 5.7 persons in rural households,
- 5.1 persons in urban ones.

The male is considered the head of the household, except where it is headed by a divorced or widowed woman (Countries and their cultures, n.d.a.). Households can host nuclear families, either polygamous or monogamous, or extended ones. In the case of a divorce, children usually remain with their mother (Countries and their cultures, n.d.a.).

same material. A prayer area may be set apart within the camp by a circle of stones. The nomadic homes can be easily dismantled and transported.

> **Sedentary settlements:** The sedentary rural population primarily occupies favourable regions (climatically and topographically) in the South and Northwest, where rain-fed and irrigation agriculture along rivers can be practiced, as well as in the coast. Bigger villages are placed near the rivers and in



Rural settlement with both demountable and permanent houses near Kismaayo, Jubaland – CC – UN Photo Stuart Price

the central interfluvial area, while small hamlets are found farther (Encyclopaedia Britannica, 2022).

Sedentary settlements can have different sizes (settlement area), spatial arrangements (geometrical pattern) and compactness (density), as shown in the forementioned study in Hirshabelle State (UN-Habitat, 2021).

According to the **spatial arrangement**, settlements can be (UN-Habitat, 2021):

- **Radial:** buildings and streets spread out from a nodal point (source of water, mosque, commerce, open space).
- **Linear:** buildings are located along natural (water courses) or human (roads) linear features, usually showing commercial activities in the main road which connects with other settlements.
- **Irregular:** settlements spread organically or clustered around land resources without apparent hierarchy.
- **Grid:** rectangular net dividing the terrain into small blocks, where streets lie perpendicular to each other (most common in larger centers subject to planning).

Regarding **compactness**, settlements can be compact (buildings close to each other), semi-compact, and dispersed (houses separated far away, often with fields or large courtyards) (UN-Habitat, 2021).

The previous spatial arrangement and compactness patterns can be applied to urban settlements as well.

► URBAN AREAS

- ↳ Urban population: 47.3% of total population (2022)
- ↳ Rate of urbanization: 4.2% annual rate of change (2020-25 est.)

Somalia is one of the fastest urbanizing countries in the world: by 2026 Somalia's urban population will overtake its rural



Xawaadley, planned urban settlement in Hirshabelle - CC – Kheyre229

population (United Nations Somalia, 2019). Still, urban in Somalia is defined by any settlement with more than 2,000 inhabitants, or even less if the settlement is a regional or district headquarter (UN-Habitat, 2021), which is quite low.

Urban population is concentrated in the old trading centres on the coast, as well as in district or regional centers. Migration from rural areas into towns has caused urban expansion, especially in Mogadishu (Encyclopaedia Britannica, 2022). In this sense, clan dynamics in the ownership and development of urban land, accelerated by displacement result in communities segregated based on clan, which leads to exclusion of specific groups from development opportunities and access to basic services (United Nations Somalia, 2019).

Different factors determine the urban character of a settlement: size, presence of water, transport infrastructure, commercial activities, presence of facilities such as mosques, schools, health post (UN-Habitat, 2021). Squares are important places for socialization (Diriye Abdulahi, 2001).

Urban settlements are generally classified as:

- > **Planned settlements:** they often present the form of a grid and are well deserved in terms of infrastructure and services.
- > **Unplanned settlements:** most cities are unplanned, dispersed, with low-density, sprawl towards agricultural land, and with poor infrastructure, all of which brings congestion, land consumption, lack of service delivery, public space deficit and environmental degradation (UN Somalia, 2019).

► IDPS SETTLEMENTS

Internal displacement caused by drought and conflict has contributed to the unplanned growth of major cities, and many internally displaced people are living in vulnerable circumstances and require durable solutions to their displacement (United Nations Somalia, 2019).

IDPs live in different types of settlement (CCLM Cluster, 2017):



IDP self-settlement in Beletweyne, Hirshabelle – CC – AMISOM

22 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

> **Self-settlement:** In this scenario, displaced population settles in public or private land within a location independently of assistance from local government, humanitarian community and/or the host community. Self-settlements are most common in urban zones and can be found dispersed in a large area of land outside of cities or within open spaces in towns. Shelter is constituted by makeshift shelters or tents.

Self-settlements are informally organized, usually after limited (or without) negotiations with the local population (host community) or private owners regarding use and access and often without negotiation with government, which makes them less sustainable. Self-settlements are typically densely populated which may lead to health or protection risks.

> **Collective center:** Pre-existing facilities or structures such as schools, abandoned buildings, places of worship, etc., are used for the collective settlement of IDPs. Displaced population usually spontaneously settles without prior arrangement with the relevant actors.

Collective centers are usually found in cities and may be densely populated and therefore prone to various protection risks, particularly for women and children.

According to Bonnet et al (2020), abandoned government owned buildings can be squatted by IDPs belonging to one or the majority clans, reason why eviction is not always possible.

> **Hosting arrangement:** In this case, displaced persons are sheltered in host communities, either with and amongst local households, on land or in properties that local people own; while hosts may be relatives, distant family members, friends or acquaintances, or people previously unknown.

Hosting arrangement can exist both in urban and rural contexts.

> **Planned settlement:** Planned settlements are built on with infrastructure to provide basic services and centralized protection, are less dense, have links to markets, land tenure is secured, and usually constitute a last settlement option by which a displaced population is accommodated as a sustainable solution.



IDP planned settlement in Doolow, Jubaland – CC – Enrique Sevillano Gutiérrez, CRAterre

4.3. CULTURAL ASPECTS IN HOUSING

► SHARED CULTURAL ASPECTS

Most Somali houses share some characteristics linked to culture, tradition, and religion (Said, 2019):

> Privacy and gender separation

Privacy at home is central both for women (as the home is their primary place for social, religious, and cultural practices), and for men (as their role is to protect his family and possessions).

Privacy and gender separation in nomadic compounds: privacy is maintained through social laws, and not through physical barriers. The *aqal* only has an entrance covered by a curtain and has no windows. It is accessible only to the family members or women visitors and not for male guests. Visitors' limiting border is at the *ardaa* or yard that surrounds the *aqal*.

Regarding gender separation, *aqal* remains the place for women. Men spend almost all their time outside and they don't usually sleep in the *aqal* at nights, but close to a fire in

the *ardaa*. In the daytime, the meeting point, place to sleep or classroom can be the shadow of a tree.

Privacy and gender separation in sedentary houses: privacy is maintained through architecture and social laws. Guests always announce before they enter a house, and the only inner space where they are allowed, accessible through the veranda, is the living room placed in the front of the house. The gates in the courtyard are blind and usually made from iron sheets. The courtyard walls can reach up to 250 to 300 cm and finish above the openings, which are covered with curtains to prevent the view from the exterior. The master bedroom is located at the back of the house, in a less accessible area.

Regarding gender separation, women usually go to their rooms if there is a male guest, while men can gather in the living room or in the courtyard. On the other hand, women guests have a free access to the house. Kitchens are only accessible by

women, and it is unpleasant for men to enter the kitchen even if they are a member of the family.

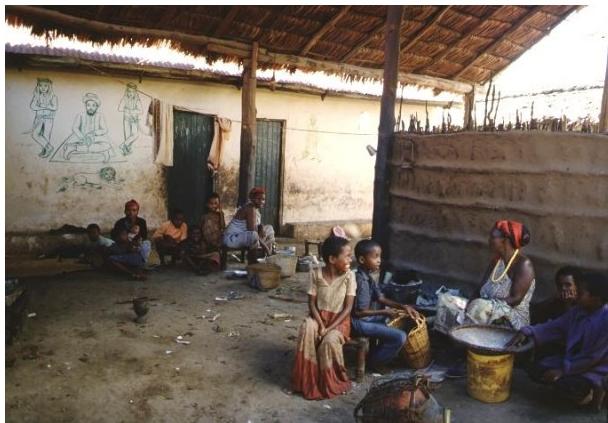
Children are separated as they turn around 6 years old, creating a need for more rooms: a room for male children, a room for female children.

> Security

Somalis have lately faced security difficulties, which has made necessary to adopt security measures in housing.

Security in nomadic compounds: it is a matter of social organization, as men watch and protect from the exterior of houses, and less a physical matter, even though thorn bush fences help protect compounds.

Security in sedentary houses: it is reflected in architecture through different features. These features include dark interiors; tall, slippery courtyard walls preferably made with



Gender separation is also a characteristic of Somali habitat. Covered courtyard in Janaale, South West State – © Thierry Joffroy, CRAterre

stone and without openings; heavy metallic gates without openings; doors and windows made of metal with reinforced bars; house constructions separated from the courtyard wall up to 1 m with windows and doors placed inside courtyards...

> Aesthetics and sensorial aspects

Use of shadow and darkness: dim light in the interior spaces is relied to the notions of privacy, gender separation, and security. Separating the spaces with walls is not enough, and layers of lush curtains in openings help control light and view.

Use of smell: *unsi* is an incense made of sugar, perfume, and spices used by women to announce their presence at home.

Use of decorative objects: handicrafts (milk containers, wedding baskets, drums, baskets, combs, and rugs); or religious items (framed excerpts of the Quran and metal plates with Islamic poetry) are very common in Somali houses.



Privacy is crucial for Somalis. Masonry house with small low windows protected from external sight. Puntland – CC Heimo Liendl

► USE OF SPACE

Different spaces may exist in Somali houses (Said, 2019; Diriye Abdulahi, 2001).

> **Kitchen:** it is the main ground for women to socialize and cook and there are usually several women together in the family kitchen. In Somali kitchens everything is mobile. Women usually cook on the floor where each woman sits on a *gambar* (short stool) and cooks while talking to each other.

In most rural areas, cooking can be done outdoors.

> **Living room:** it is the social area of the family. It is a place where guests are hosted, especially men. This space has no fixed furniture, but has *fadhi carbeed*, pillows with velvet fabrics of bright colors and ornate patterns connected in a serial way throughout the wall with enough space to host the whole household with their guests. The living room has dim light, and its openings are covered with layers of curtains.

Meals are taken in the living room, either all family members together in one circle when there are no male guests, or only men with male guests in the living room while women use their own space to eat together.

Some families have a single room that will serve as living room and bedroom, as well as a storage for family goods.

> **Bedrooms:** Each household has at least one bedroom used for storing belongings and sleeping. The number of rooms depends on need and economic means. More than 4 people can share one room. In rural areas, separate constructions will serve the purpose of bedrooms, while in some urban houses all bedrooms will be placed in the same construction. Either way, this allows different members of the family to have some privacy respecting gender separation issues. Somali rooms are kept dark, and in most of them everything inside is mobile.

24 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

In many urban houses there are three bedrooms: one for the couple, one for male children and one for female children.

> **Bathroom and toilet:** *suuli* is a space gathering bathroom and toilet, and *musqul* is only a toilet. Septic tanks are commonly used for the toilets. The toilet sit is not directed towards or against the *qibla* (the direction of Mecca).

Bath is usually taken using a vessel filled with water filled with water from outside of the *suuli* or an interior tap.

When these spaces exist, they are kept separate from rooms.

> **Courtyard:** the courtyard is a necessary and important space for most Somalis and are present both in urban and rural areas. *Ardaa* is the name of the courtyard and the name of the men's fire in nomadic houses, it is where stories are told.

The average Somali household is big, has many children and usually hosts relatives at home. People from different genders that can marry each other cannot stay together, and therefore men and women socialize separately. Because of these



Village of Caramadaw (Somaliland), where each compound has a clear limit with the courtyard fence, a courtyard with shadowed exterior spaces, and different constructions for different uses – CC – UNDP - Said Fadhaye

reasons, open space is necessary for the family as a place of socialization. Also, children use courtyards as playgrounds.

Moreover, hot climate at daytime makes the walls of houses absorb heat and release it at night. Consequently, inner temperature is higher at the first part of the night and decreases as the outside temperature gets cooler, reason why people stay at the courtyard to socialize at the beginning of the night. People also spend time in courtyards during daytime, under the shadow of trees or sheds covered with thatch.

> **Veranda:** some houses have a veranda where it is possible to do different activities during daytime under a shadow.

> **Storage:** some houses have a particular room for storage.

> **Haraa or boma:** in rural areas, compounds usually have a *haraa* or *boma* enclosure for goats, camels, and cows.

> **Gamaas or daash:** there is usually an open enclosed space used for prayers, for relaxing at night outside and sleeping (family men and men visitors).

> **Qaypta adeega:** it is a separated block present in some houses, or service side, where a kitchen for special occasions like ceremonies and parties, a toilet, and a guest room can be found, what helps maintain the privacy of the family.

↳ TO FIND OUT MORE

SAID, D., M. (2019). COMPARISON OF THE PREFERENCES OF USERS TOWARDS TRADITIONAL AND THE NEW RESIDENTIAL HOUSES IN SOMALIA

https://acikbilim.yok.gov.tr/bitstream/handle/20.500.12/623564/yokAcikBilim_10238747.pdf?sequence=1&isAllowed=y

► TYPES OF HOUSING

The previous spaces can be found together in the same construction in urban areas, but they are found as separate constructions in many rural and peri-urban areas. Thus, it is important to address the variation of housing and lifestyles in the country.

> Nomadic compounds

They exist in rural areas and are called *guri* (Diriye Abdulahi, 2001). Usually, several kinship households are settled together. Each household has at least one room (*aqal* or *buul*, which can be demounted if necessary) used for storing belongings and sleeping. The number of rooms depends on need and economic means. A *gamaas* or *daash*, open enclosed

space used for prayers, for relaxing at night outside and sleeping (men and visitors) is common. Usually, there is an outdoor cooking area. There can be a shared toilet used also for shower.

These compounds most times have a fence made of bush thorns, and there is usually a *haraa* or *boma* enclosure for goats, camels and cows.

> Sedentary compounds

They are more common in rural areas. Families live in compounds with one or various permanent rooms (usually different constructions) which can have or not a veranda. There is usually a *gamaas* or *daash*, open enclosed space used

for prayers, for relaxing at night outside and sleeping (men and visitors). There is usually an outdoors cooking area and there can be a toilet used also for shower.

The position of the main house, the outdoor washroom and cooking site considers privacy issues. Usually, the position of the house and the main gate are aligned, while the kitchen and outdoor washroom are situated at the back. Plant life is important and trees are planted for shade. Also, simple huts without solid walls can be present. The shade/canopy is used for afternoon resting.

These compounds have a vegetal fence and there can be a *haraa* or *boma*, enclosure for goats, small chicken coops.

> Individual family housing

Individual houses of several types are common in urban areas: bungalows (individual houses with one single level); villas (individual houses with two or three levels); and others. Most of the uses are inside the same construction (bedrooms, living room, etc.). Kitchen, toilet, and shower can be either inside or outside the main construction within the family compound. They usually have a high boundary for security reasons.

Outdoor space (courtyard) is also present, often with a veranda. Sometimes shadowed spaces can be found, which are used during daytime. As in sedentary compounds, the position of different constructions (when they exist) particularly takes into account privacy issues.

> Collective housing

Collective housing is only present in urban areas and can be of different types:

Apartment within story buildings: they are found in urban centers. All uses are reunited in an apartment (bedrooms, living room, kitchen, toilet, shower, balcony...).

Ground floor collective housing: these are ground floor constructions, consisting of separate dwellings that accommodate several households. In this case, the compound is a group of dwellings with no ties between its inhabitants. They are formed by a succession of housing units composed of one or two rooms that open onto a common courtyard where the toilets are located and families install kitchens.

Gated communities with individual houses: several privative individual houses with own access and enclosure share main accesses and protection. The spaces are the same as in individual houses shown hereafter.



Nomadic compound in Tukaraq, Somaliland – CC – ICRC



Sedentary compound in Doolow, Jubaland – CC – Enrique Sevillano Gutiérrez, CRAterre



Individual family houses in Doolow, Jubaland - CC – Enrique Sevillano Gutiérrez, CRAterre



Apartment buildings in Bosaso, Puntland - CC – Yusuf Som

26 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

4.4. LOCAL AFFORDABLE CONSTRUCTION TYPES

► In this section, different types of local affordable houses are presented. All the typologies described exist, are built, and inhabited nowadays. There are three main types of buildings today in the country (apart from some [typologies that respond to the humanitarian crisis](#)):

- > Vernacular typologies
- > Makeshift typologies
- > Globalized style typologies

► VERNACULAR ARCHITECTURE

Architecture and urbanism are influenced by the existing cultural zones (Said, 2019):

> **Pastoral nomadic zones:** Nomads are herders who live mainly in the center and north of the country. The portable *aqal*, is the architecture of these zones.



Aqal in Puntland – CC – Heimo Liendl

> **Agropastoral zones:** Groups of mixed sedentary and semi-sedentary farmers and herders who live between the Juba and Shabelle rivers have *mudul* or *mundul*, and *cariish* (read as *arish*) or *baraako*, and as their architectural forms. Sedentary population, particularly in the north, have stone and adobe rectangular houses, as well as *baraako*.

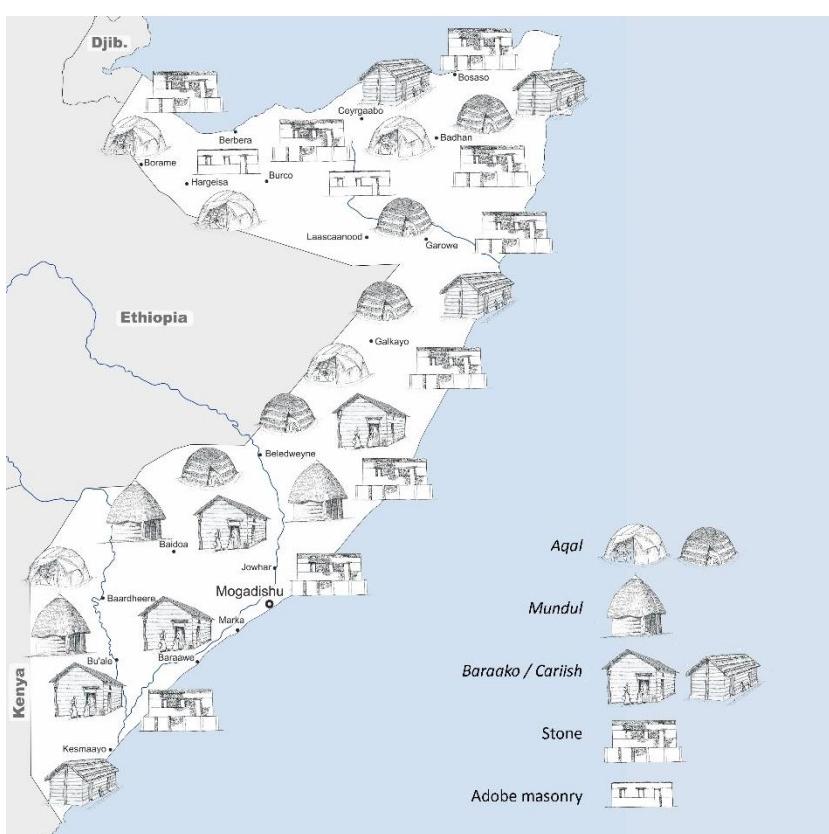


Mundul near Janaale, South West State – © Thierry Joffroy, CRAterre

> **Coastal areas:** In this zone lives a heterogeneous population, who are the countries' historical traders. The rectangular, courtyarded, often white, sometimes multi-storeyed buildings usually built with limestone, with a flat roof or corrugated iron roof are the urban houses of coastal areas and at a lesser extent of Somalia in general. In these areas there are also *cariish*, generally without earth plastering.



Baraako house, Janaale, South West State – © Thierry Joffroy, CRAterre



Map of vernacular architecture in Somalia – Own elaboration with drawings by Javier Bonifaz, CRAterre



Stone constructions in Puntland – CC Heimo Liendl

AQAL



> General description

Pastoral nomads live in demountable and transportable round dome-shaped huts called *aqal* constructed of collapsible wood frames covered in panels woven from palm fronds, acacia bark, cotton fabrics recycled from old dresses (Janzen & Lewis, 2022), as well as sometimes leather. It is carried on camels' backs and set up by women once a new camp is made.

It represents more than a house, as it is a masterpiece where the woman is both the architect and the builder. In pastoral zones, a house is the woman's territory and possession (Mambo, 2014, as cited in Said, 2019). Women are responsible for the house and nearly everything in it, and their craft is all part of their housework (Fullerton & Adan, 1995).

The *aqal* is a hemispherical dome about 1.50 to 2.13 meters in height; the smallest *aqal* is called *buul* (they are now used among IDPs and will be explained later in this chapter), the largest type is called *labo daryaal*, formerly used for weddings (Fullerton & Adan, 1995). The size depends on availability of materials, and they are bigger in areas where materials are more easily accessible (Fullerton & Adan, 1995).

> Construction process

Men choose the settlement with the best grass and water, while women choose where, how and when to build the house (Mambo, 2014, as cited in Said, 2019). Women construct the *aqal*, demount it and mount it again after each move, maintain it and repair its components and provide new *aqal* for their daughters or women folks (Fullerton & Adan, 1995). According to Mambo (2014), women provide the materials needed and manufacture them: they prepare the structure and weave the mats.

All women used to know, and some still know where to source the materials, make fiber mats and select and use dried and shaped acacia roots to serve as pillars (Mire, 2015).

All the work can be done by two or three women and up to four, as doing it alone is not easy (Fullerton & Adan, 1995).

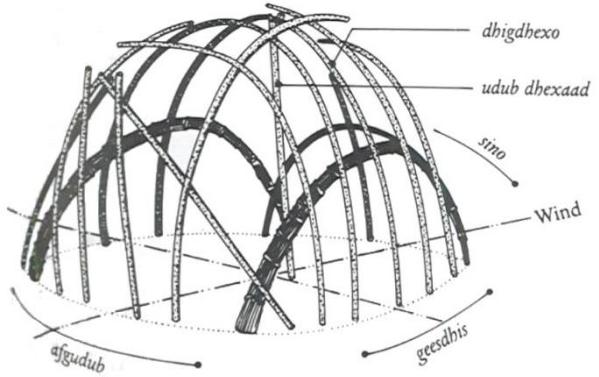
> Construction elements

Aqal have three parts tied together as a web to form a strong impermeable package (Fullerton & Adan, 1995; Marco, 1994; Shafi, 2007):

- Semi-circular shaped poles (called *dhigo*). They give the *aqal* strength and form. There are two types depending on the



Aqal in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Structure of an *aqal* – © Fullerton & Adan (1995)



Interior of an *aqal* in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre

28 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

function and strength: *qabax* are the thicker and have a structural role, and *lool* are thinner and have no structural function, but help implement the shape and hold the coverings. The holes for *qabax* are dug about 45 cm (mid-arm).

- Vertical poles which are used for reinforcement (called *udub*). They are used to support the framework of *qabax*. Their number varies between seven and twelve and are also firmly planted into the ground. The most important one is the one in the center: *udub dhixaad*, while others are placed near the end of *qabax* to shore up each side. *Udub* are also used to partition the house.
- Layers of woven mats (called *saari*). They are used for covering, protection and decoration and are mainly of grass, sisal, reed, and acacia fiber, but also of waste leather, any other light materials, and palm leaves where they are available.

- Large woven mats are called *caws* (same name grass), *harrar* or *raar*, depending on the region.
- The *kebed* is another covering, with decorative and protective functions made using fibers from *Acacia bussei* (*galool*) tree branches.
- *Kebed* and *caws* are used outdoors or indoors. *Dulsaar* are old *caws* and *kebed* which have lost their beauty but are functional for protection.
- *Dermo* are floor mats used for prayer, sleeping, or sitting. *Gogol* are sleeping mats used under the *dermo* or outside the *aqal* by men.
- Other types of mats (*saari*) used indoors: *lammo* and *hohab* (small decorative mats made with sisal fibers); *aloool* (very colorful room partition, doorway and protection against wind, measuring 4 m by 2 m high).
- A tarpaulin is often added for increased impermeability (Diriye Abdulahi, 2001).

> Inner space

Nomads have few possessions: cooking utensils, storage boxes, stools, woven mats, and water recipients, together with a wooden bed (Countries and their cultures, n.d.b.).

The *aqal* is divided into two parts: an atrium (*dadab*), part of the entryway, and an inner area where the family sleeps (Diriye Abdulahi, 2001). Older male children and the father sleep in the fire corner outdoors, except in rainy time, while older daughters and grandmothers sometimes have their own smaller houses (*buul*) (Diriye Abdulahi, 2001).

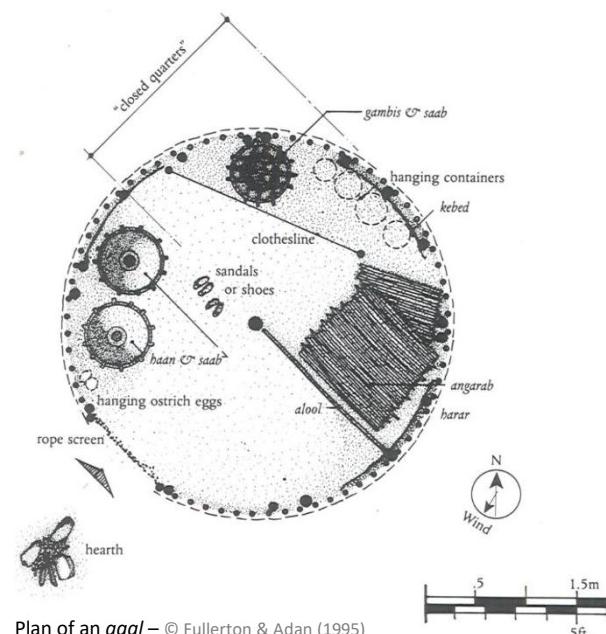
> **Cost:** no financial cost if all materials are gathered in nature.



Holes made for the poles of *aqal* in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Detail of mats and structure in an *aqal* in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Plan of an *aqal* – © Fullerton & Adan (1995)

↳ TO FIND OUT MORE

FULLERTON, A. & ADAN, A. (1995). HANDICRAFTS OF THE NOMADIC WOMEN OF SOMALIA

<https://arcadia.sba.uniroma3.it/bitstream/2307/1353/1/Handicrafts%20of%20the%20nomadic%20women%20of%20Somalia.pdf>

MUNDUL



> **General description:** They are mainly found in the interior of central and southern zones, where lives a sedentary population of farmers.

Mundul have a circular plan with cylindrical walls and conical thatched roofs (Janzen & Lewis, 2022) and their plan has a diameter of 3 to 4 m (Joffroy et al., 1992).

> **Construction process** (Marco, 1994): Both men and women harvest local materials. The construction of a *mundul* requires at least four men usually during seven days. On Saturday, works begin and must be finished on the following Friday, holy day for Muslims.

Men build the structural complex and the roof, while women cover the walls with earthen plaster (when applicable).

> Construction elements

Walls structure. The cylindrical walls have a structure of poles and brush, or vines (Countries and their cultures, n.d.b). The poles can have a stone foundation.

The walls' structure consists of sturdy branches at spacing of 40-50 cm buffered by a continuum of bundles of thin twigs intertwined and held tightly by very strong roots and tied to the former with other strong ties (Marco, 1994).

Roof. Walls are covered with a broad, conical thatched roof. The cone structure is a continuation of the vertical walls in that the flexible ends of the main elements of these are folded according to the slope of the cone and suitably extended with other branches, and close on the central pillar (Marco, 1994). The roof upper part can have a lime mortar hat as protection (Joffroy et al., 1992).

Central pillar. The central pillar is the structural key and the center of connection of the inclined elements (Marco, 1994).

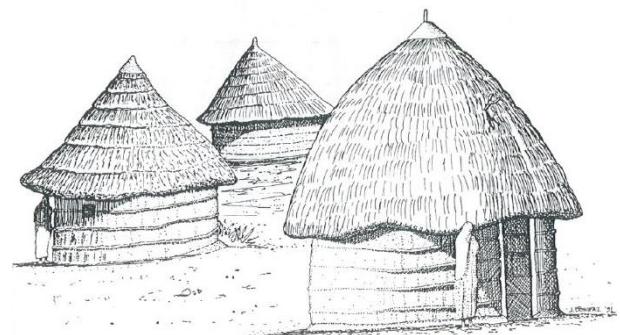
Plastering. Walls can be plastered or unplastered. The tight weave of the base trellis forms an anti-shrinkage armor for the mortar of the plaster, which is prepared using an inert red termite soil (*arra gudud*) reduced to dust by the women, together with cattle manure and water (Marco, 1994).

> **Inner space:** The *mundul* does not have partitions but has some simple furniture.

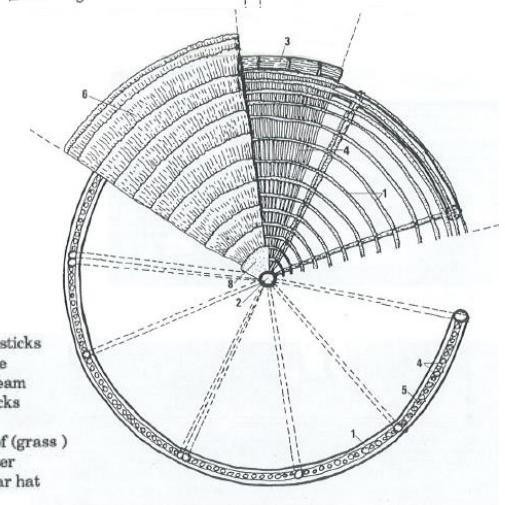
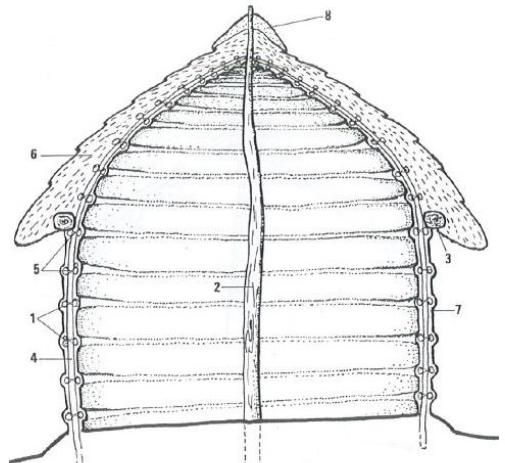
> **Cost** (Shelter Cluster Somalia, 2022): USD 300-400 depending on the location.



Mundul near Janaale, South West State – © Thierry Joffroy, CRAterre



Different *mundul* – © Javier Bonifaz, CRAterre



Technical details of a *mundul* – © Javier Bonifaz, CRAterre

30 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

CAARISH OR BARAAKO



> **General description:** These permanent constructions have a rectangular plan and a two or four slopes roof and are one of the permanent vernacular houses of Somalia. These houses are found in the agricultural areas of the country (Mambo, 2014, as cited in Said, 2019), but also in the coastal areas to host fishermen (Marco, 1994), and in the district and provincial capitals of the interior (Countries and their cultures, n.d.b.).

Their size varies from short span (3 m) to medium span buildings (6 m) (Joffroy et al., 1992), with a diversity of lengths.

> **Construction process:** Both men and women harvest local materials. The structural complex and the roof are built by men, while women cover the walls with earthen plaster (when applicable). The timber work can be done by skilled carpenters.

> Construction elements

Walls structure. The walls have a structure of poles and brush, or vines (Countries and their cultures, n.d.b) embedded on the ground and sometimes with stones acting as foundation where the poles lie and as protection and reinforcement of the poles surrounding them underground.

The walls structure of the walls consists of sturdy branches at spacing of 40-50 cm buffered by a continuum of bundles of thin twigs intertwined and held tightly by very strong roots and tied to the former with other strong ties (Marco, 1994).

The timber and vegetal structure can also be used to build semi-open covered courtyards with a good thermal comfort (Joffroy et al., 1992).

Roof. They are covered with a two or four sloped CGI sheet or thatched roof (Mambo, 2014, as cited in Said, 2019). The first option is majoritarian nowadays.

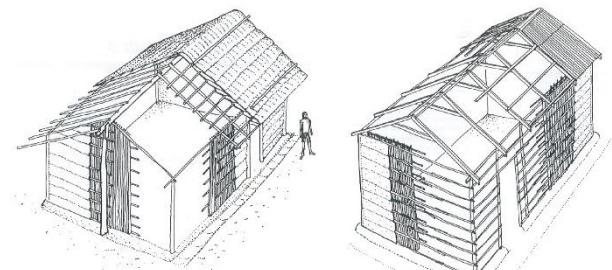
Plastering. Walls can be plastered or unplastered. The tight weave of the base trellis forms an anti-shrinkage armor for the mortar of the plaster, which is prepared using an inert red termite soil (*arra gudud*) reduced to dust by the women, together with cattle manure and water (Marco, 1994).

> **Inner space:** These constructions can have partitions. Furniture is simple and there are beds with timber structure.

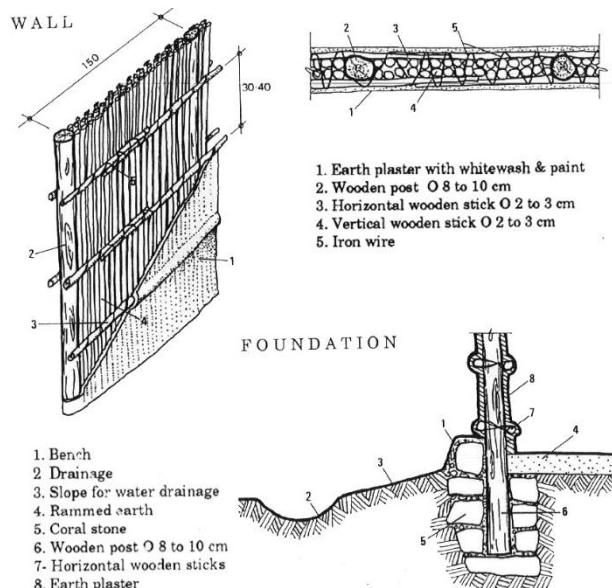
> **Cost** (Shelter Cluster Somalia, 2022): USD 500-700 depending on the location.



Baraako houses in Baidoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre



Sectional views of *baraako* with two slopes roofs (thatch on the left and CGI sheets on the right) – © Javier Bonifaz, CRAterre

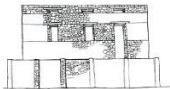


Technical details of a *baraako* walls and foundation – © Thierry Joffroy, CRAterre



Woman smoothing a *baraako* house in Janaale, South West State – © Thierry Joffroy, CRAterre

DAAR (STONE HOUSES)



> **General description:** Towns and villages in the northern part of Somalia, as well as in the coast of the entire country have historically used the local stones (especially coral limestone) to construct houses and other buildings: mosques, stores, administrative buildings, courtyards, perimeter walls... (Maisons du Monde, n.d.). These houses have generally white facades.

There are one to three-story stone houses in the coast, while in the interior single-story stone buildings predominate. Most of these houses have courtyards and can have one or multiple rooms, going up to 6 (Said, 2019). Moreover, flat roofs are used by both women and men (separately) during religious and social ceremonies (Scikei, 2017).

Multi-story houses made with stone (and sometimes with parts of adobe) can reach up to eleven (11) meters high (Said, 2019). In traditional construction, the width of a room could not exceed 3.60 m without a wooden beam more than 4 m in length, which was difficult to find (Scikei, 2017).

> **Construction process:** Skilled masons and carpenters are involved in this type of construction with the support of helpers. Frameworks for roofing and installation of CGI sheets are tasks made by carpenters.

> Construction elements

Walls. Walls are built from locally available stone, and adobe.

The stone buildings in coastal areas were made using coral, which was burnt to create lime and mixed with sand. Quarrying of lime and kilns to bake it were important local industries (Scikei, 2017).

There are different patterns of stonework, different colors of stones (from pinkish to white hues), as well as colorings applied to the layers of stones, particularly in the north (Diriye Abdulahi, 2001).

Houses in town centers used to have battlemented cornices (Adbulkadir Ahmed et al., 2021).

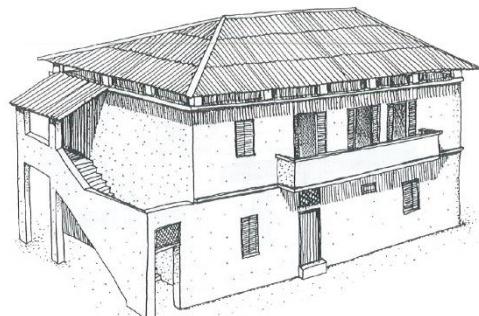
Slab. Slabs are with rafters every 30 to 40 cm and wooden planks (Joffroy et al, 1992). The span of each room is determined by the length of the ceiling beams made (in Mogadishu) from *harar* (the wood of *terminalia spinosa*), or *boriti* (*mangrovia*) imported from Lamu (Kenya) (Scikei, 2017).



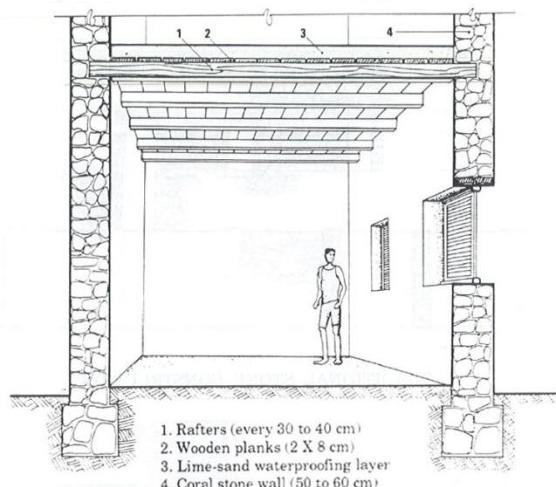
Daar stone houses in Mogadishu – CC Frank Keillor



Stone houses in Merca, South West State – © Thierry Joffroy, CRAterre



Perspective of two-story stone house with CGI hip roof – © Javier Bonifaz, CRAterre



Stone masonry section – © Javier Bonifaz, CRAterre

32 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

Roof. They can have a flat roof or a corrugated-steel roof with two or four slopes.

- Flat roofs are made with rafters and wooden planks (as slabs) while waterproofing is assured by a lime and sand layer on top of this structure (Joffroy et al, 1992).
- CGI sheet roofs are predominant nowadays and are most usually hip roofs (four slopes).

Finishings. Houses are often whitewashed with lime and are covered with lime plasters or cement. Domestic buildings are simple, and lacking in ostentation (Scikei, 2017).

Openings. Bars cover the lower windows, which rarely have screens or glass. (Countries and their cultures, n.d.b)

> **Inner space**: Interiors usually have partitions and high ceilings and are usually shady and protected from exterior views. Furniture is present more richly than in previous models.

> **Cost** (2022): Greatly varies depending on design

ADOBES HOUSES



> **General description**: Adobes (sun-dried earth bricks) are traditionally used in two kinds of buildings:

- In coastal towns in the north (Diriye Abdulahi, 2001), particularly Puntland and Somaliland, they are present together with stone, usually in the same buildings. The characteristics of these constructions are quite similar as those described for stone houses. When walls are built with adobe, there is usually a stone foundation and plinth and a plastering to protect the wall.
- In rural areas of the north of the country, adobes appear alone as closing walls of constructions called *dargad* (Diriye Abdulahi, 2001), which usually have a timber structure supporting a nearly flat roof.

More information about adobe construction in Somalia would be needed to deepen in this section.

> **Cost** (2022): No data



Masonry construction (adobe and/or stone, as they are not visible with the plaster) in Berbera, Puntland – CC - Ignacio Gallego



Adobe house in Berbera, Somaliland – CC Clay Gilliland



Adobe house in a rural area of Somaliland – © Justin - The velvet rocket

► MAKESHIFT TYPOLOGIES

Makeshift typologies are built by low-income families, IDPs, or by those who, without a land property title, prefer to limit their investment by choosing light structures that are easy to dismantle or repair. Usually, homes are located very close to one another, and drainage is inadequate, resulting in unsafe and unsanitary conditions.

BUUL (BUUSH)

> **General description:** Many IDPs and urban poor live in dome-shaped makeshift housing called *buul*, built with materials sourced in nature, in local markets, through recycling or through humanitarian assistance. *Buul* are self-built, which is a solution for IDPs and urban poor due to rising housing prices (Bonnet et al, 2020). However, IDPs are often forced to pay rent for the land where they settle (The Somalia Cash Consortium, 2013).

Buul exist in vernacular architecture as the smaller huts where live single young women or widows within a nomadic compound (Fullerton & Adan, 1995). In this case, materials used come from nature and recycling and shelters are more comfortable.

> **Construction process:** They are self-constructed with help from family and friends (Bonnet et al, 2020). They are most usually built by women and are normally the first to be displaced together with children (Gist Research et al, 2022).

They are built in different sizes based on the length of the sticks found in the market or in the bushes around. The small *buul* that can be found at IDP camps do not have adequate space for families or even for standing inside, but there are larger *buul* shelters that provides adequate space (like *aqal*).

> Construction elements

Structure: sticks for the dome structure.

Covering: cartons, plastic, mats, or pieces of cloth. Mosquito nets are sometimes used as outside layer to fix all the small pieces of cloth.

> **Inner space:** Single space without partitions where some belongings are stored and there can be some simple furniture such as beds.

> **Cost** (2022): Free of cost (or nearly) for inhabitants in terms of materials and labor.



Construction of the structure of a *buul* in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Series of *buul* in an IDP camp. Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Interior of a *buul* in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



CGI makeshift shelters in Galkayo, Galmudug State – © UNHCR - Samuel Otieno

CGI SELF-BUILT SHELTERS

> **General description:** built by the urban poor and by IDPs who don't receive assistance. It has connotations of permanence (Emergency Shelter NFI Cluster, 2013).

> **Construction process:** self-built by low-income families and some IDPs.

> Construction elements

Structure: used timber.

Walls and roof: recycled used materials: CGI sheets, cartons, clothes, plastic sheets...

> **Inner space:** Single space without partitions where some belongings are stored and there can be some simple furniture such as beds.

> **Cost** (2022): Free of cost (or nearly) for inhabitants in terms of materials and labor.

34 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

► GLOBALIZED STYLE TYPOLOGIES

Villas or multi-storey buildings are globalized style typologies, mostly disconnected from the local building cultures and not affordable for a majority of the population.

Indeed, today we find cities full of hip roofs made from metal sheets, walls with small openings, less and less patios or verandas, as well as the abandonment of local materials such as stone (Adbulkadir Ahmed et al., 2021). In recent years, due to the civil war and subsequent decentralization, many towns across the country have transformed into urban centers. For example, in the cities of Garowe, Bosaso and Hargeisa, construction companies have built residential areas in a globalized style (Maisons du Monde, n.d.) using concrete, steel and glass materials.

As these globalized styles typologies are not really affordable for the greatest number of Somalis, they will not be deeply described.

CGI MIDDLE-INCOME HOUSING

These houses are usually inhabited by lower-middle class residents and are located within cities as well as on the periphery, where more land is available for new developments (Bonnet et al, 2020). Regardless of their low quality, the pricing of these houses places them beyond the reach of lower-income earners (Bonnet et al, 2020). They are sometimes built on a stone foundation. The structure is made of timber poles and all the walls and roof are made with CGI sheets.

STONE AND/OR CEMENT BLOCK HOUSES WITH OR WITHOUT CONCRETE STRUCTURES (SUCH AS VILLAS)

These houses have usually rectangular or more complex shapes and are built within their own compounds. They are accessible to upper-middle class and wealthy residents (Bonnet et al, 2020).

Foundation and walls are made of stone, cement, sand, gravel, and sometimes concrete. There are sometimes concrete frameworks for the structure. The walls are made with stone or cement blocks. Roofs can be either sloped (more usually) or flat. Sloped roofs can have 2 or 4 slopes and the framework is usually made of timber with the covering made of CGI sheets or tiles. Flat roofs are usually concrete slabs.

APARTMENT STORY BUILDINGS

They are inhabited by middle-class and upper middle-class Somalis (Bonnet et al, 2020) and found in major city centers. They are designed and built by professionals, using imported materials and globalized techniques and are used to deal with the city sprawl and hold a denser population into one area (Said, 2019). These buildings discourage the Somali way of neighborhood, and kinship relations (Said, 2019).

They have a reinforced concrete structure. Walls are made of cement blocks, or more rarely of stone, with cement mortar. They have concrete slabs for the different floors and can have flat concrete roofs or sloped roofs made with CGI sheets or tiles.



Globalized style houses in Diinsoor – South West State – CC AMISOM / Abdi Dakane



CGI construction with hip roof in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Construction with stone and Reinforced Concrete structure in Baidoa, South West State – CC AMISOM / Abdi Dakane



Villa in Belet Hawa, Jubaland – CC Asha Abdukadir



Apartment buildings and villas in Mogadishu – CC MrMidnimo

4.5. CONSTRUCTION MATERIALS

► TYPES OF MATERIALS

MINERAL ORIGIN MATERIALS

> **Earth**: used in wattle-and-daub walls (*baraako, mundul*), as mortar in stone walls, for adobe bricks production and mortar of adobe constructions, and for flat roofs. Termite soil is used for plastering *baraako* and *mundul*. Compressed Earth Blocks, whether stabilized (CSEB) or not (CEB) exist in the country in an incipient stage.

> **Stone**: quarry stone is available throughout the country. It is used in foundations of different typologies and as main material of masonry walls as infill or as bearing wall.

> **Limestone or coral stone**: it is used a stone for construction and as source for the production of lime for plastering. Limestone can be found in the interior of the country, for example south of Beletweyne (Hirshabelle State) (FSNAU & FEWS NET, 2016). Coral stone is found in corals in the coast.

> **Lime**: Lime is used for mortars and for whitewashing.

> **Fired bricks**: Not very common, they are mostly used in cities

> **Sand**: it is used primarily for cement and concrete construction.

> **Gravel**: it is also used mainly for concrete construction. In the coast it is most often crushed coral stone, not very hard.

> **Other**: the country holds deposits of bauxite, copper, iron, kaolin, quartz, granite, silica, sandstone (Atta et al, 2021).

ANIMAL ORIGIN MATERIALS

> **Leather**: it is used in the form of strings to tie different elements of *aqal*.

> **Cow dung**: used in finishings of wattle-and-daub houses mixed with earth.

> **Goat twine**: used in *aqal* for protection of structural elements.

VEGETAL ORIGIN MATERIALS

> **Reed**: it is used in different forms, for traditional flat roofs or for the production of woven mats for *aqal*. Three *duur*, thin reed, are used to make *lool*, smaller structural elements of *aqal* (Fullerton & Adan, 1995).

> **Grass**: used for thatched roofs, but also for the fabrication of the mats of *aqal*. *Caws* is the name given to all grasses, while *maadh* is the most quality grass for weaving mats (Fullerton & Adan, 1995).

> **Palm leaves**: they are used to weave mats for *aqal* (Fullerton & Adan, 1995), as well as for thatched roofs wherever they are available.

> **Sisal fiber** (Fullerton & Adan, 1995): used for mat weaving, particularly for decorative mats. The sisal leaves are cut and pounded with the addition of some water and then buried for seven days, after what they are washed. The green part will have rotten and easily washed away, and the white part will be dried before use. The white color is used without dying as one of the finished colors of different decoration motifs.

 A selection of construction materials used in Somalia is presented here in a non-exhaustive way.



Production of CSEB with manual machine in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Stone for foundation in Belet Hawa, Jubaland – CC Asha Abdulkadir



Baraako houses whitewashed with lime in Janaale, South West State – © Thierry Joffroy, CRAterre



Grass (*caw*) is used for fabricating mats for *aqal* – CC Shafi



Palm leaves in a thatched roof – © Thierry Joffroy, CRAterre

36 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

> **Bark:** the red pigment traditionally used for dying mats for the *aqal* came from the bark of acacia (*galool*) (Fullerton & Adan, 1995).

> **Roots:** Acacia roots are used for *qabax* and *ubud*, main structural elements of *aqal* (Fullerton & Adan, 1995).

> **Branches:** they are used as part of the frameworks of vernacular constructions (*baraako, mundul*). Acacia *bussei* (*galool*) branches are transformed into fibers to weave *kebel* mats for *aqal* (Fullerton & Adan, 1995).

> **Bamboo:** it can be used as structural component of some constructions.

> **Other plants:** black **traditional pigment** used for dying mats for the *aqal* came from a poisonous plant called *dacar*. **Fiber ropes** are made from different plants and used to tie, anchor different construction elements.

> **Timber:** wood is the main construction material for many Somalis. It is used as framework for many types of walls such as CGI sheets, *baraako* or *mundul* and as framework of all inclined roofs. It is mostly imported nowadays, particularly squared timber. There is a real knowledge of minimalist use of imported wood. Natural wooden logs are sometimes taken from nature, despite deforestation problems. Timber is also used in openings, enclosures, ceilings, slabs, plywood panels, etc. Here is a summary of useful trees for construction (Mahony, 1994):

SOMALI TREES						
Tree species	Use	Timber	Shelter-belts	Poles	People shade	Live fencing
<i>Acacia albida</i> So: <i>Garbi</i> En: Apple ring acacia						
<i>Acacia nilotica</i> So: <i>Tugaar</i> En: Egyptian thorn						
<i>Acacia senegal</i> So: <i>Cadaad</i> En: Gum arabic						
<i>Acacia tortilis</i> So: <i>Qurac</i> En: Umbrella thorn						
<i>Balanites aegyptiaca</i> So: <i>Quud</i> En: Soapberry tree						
<i>Commiphora myrrha</i> So: <i>Dheddin</i> En: Myrrh tree						
<i>Conocarpus lancifolius</i> So: <i>Dhamas</i> En: Common tug tree						
<i>Hyphaene compressa</i> So: <i>Baar</i> En: Doum palm						
<i>Juniperus excelsa</i> So: <i>Dayib</i> En: Pencil cedar						
<i>Phoenix dactylifera</i> So: <i>Timir</i> En: Date palm						
<i>Salvadora persica</i> So: <i>Caday</i> En: Tootbrush tree						
<i>Tamarindus indica</i> So: <i>Raqay</i> En: Tamarind						
<i>Tamarix aphylla</i> So: <i>Dhuur</i> En: Tamarisk						
<i>Terminalia spinosa</i> So: <i>Xarar</i> En: Spiny desert tree						
<i>Ziziphus mauritiana</i> So: <i>Gob</i> En: Chinese date						



Baraako without plaster and with palm leaves roof in Puntland – CC Heimo Liendl



Timber for sale in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Wall of an unplastered *baraako* in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Flat roof built with timber in Eyl, Puntland – CC Heimo Liendl



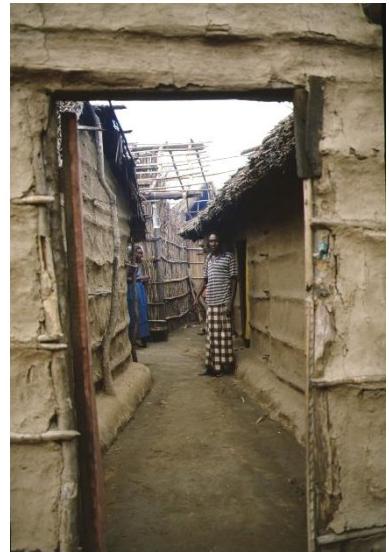
Different types of bushes and branches are used for living or dead fences. Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre

FOREIGN TREES							
Tree species	Use	Timber	Shelter-belts	Poles	People shade	Live fencing	Dead fencing
<i>Albizia lebbeck</i> So: - En: Siris tree							
<i>Azadirachta indica</i> So: Geed hindi En: Neem							
<i>Cassia siamea</i> So: Boardi En: Ironwood							
<i>Casuarina equisetifolia</i> So: Shawri En: Whistling pine							
<i>Eucalyptus camaldulensis</i> So: Baxarasaaf En: Red river gum							
<i>Khaya senegalensis</i> So: Mahogany En: African mahogany							
<i>Leucaena leucocephala</i> So: - En: ipil-ipil tree							
<i>Parkinsonia aculeata</i> So: Geed walaayo En: Hardbean							
<i>Prosopis cineraria</i> So: - En: Ghaf							
<i>Prosopis juliflora</i> So: - En: Algaroba							
<i>Schinus molle</i> So: Mirimiri En: Pepper tree							
<i>Sesbania grandiflora</i> So: - En: Corlwood tree							
<i>Anacardium occidentale</i> So: Bibbo En: Cashew nut							
<i>Cocos nucifera</i> So: Naarajin En: Coconut							
<i>Mangifera indica</i> So: Cambe En: Mango							
<i>Psidium guajava</i> So: Seytuun En: Guava							
<i>Terminalia catappa</i> So: Beydaan En: Indian almond							

TO FIND OUT MORE

MAHONY, D. (1994). TREES OF SOMALIA: A FIELD GUIDE FOR DEVELOPMENT WORKERS

<https://policy-practice.oxfam.org/resources/trees-of-somalia-a-field-guide-for-development-workers-121179/>



Timber, other vegetal fibers and earth are used together in *bareaako* houses. Janaale, South West State – © Thierry Joffroy, CRAterre



Branches necessary for the construction of a *buul*. Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Production of cement hollow blocks in Puntland – CC Heimo Liendl

INDUSTRIAL ORIGIN MATERIALS

Industrial materials such as cement, concrete, steel, wood, and ceramic are more and more used in construction in Somalia (Atta et al, 2021). They are mainly imported from China, Turkey, the UAE and India, which limits the growth of local manufacturing production (Atta et al, 2021). Most imported construction products provide a reduced variety of choice and poor quality in favor of an easy supply chain and, above all, relatively low costs, which encourage their use (Atta et al, 2021).

According to a 2021 study (Atta et al, 2021), the largest share of imports dedicated to construction materials consists of metal from China, India and the UAE (USD ~110 M) and cement from Oman, Iran and the UAE (USD ~30 M), but also ceramics and wood have important levels of import primarily from China and the Middle East.

> **Cement:** cement has several uses (Atta et al, 2021).

- Cement blocks: they can be hollow or solid and are made from cast concrete, composed of Portland cement and aggregate (usually sand and fine gravel) for high-density blocks, while including industrial wastes (such as fly ash or bottom

38 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

ash) as an aggregate for lower-density blocks. They are produced manually using compressing machines. Typically, cement is mixed with coarse sand and gravel with the ratio of 1:2:3, respectively, for the casting part. Casts are fully filled with the concrete created on site and compressed using the machine. After compression, pieces of flat wood are placed under the concrete blocks as a support, allowing the operators to set them down (preferably under the sun) in order to let the blocks dry out for about 2 days. Afterwards, blocks are kept wet to provide enough compressive strength. Most hollow bricks have these dimensions: 400 mm L x 300 mm H x 200 mm S.

Hollow blocks are mainly used in elevation walls, while solid blocks are more used in foundations and plinths.

- Reinforced concrete structure: pillars and beams in structural concrete (with different diameters steel bars) (Atta et al, 2021). There are also slabs constructed with this technique for ground or upper floors.
- Plaster: cement is also used in plasters for finishings, together with sand and water.

> **Steel:** it is used in reinforced concrete structures, but also steel reinforcement bars (rebar) are used both vertically and horizontally inside cement blocks walls to maximize the structural performance, and grouting cells with rebars are used for enabling their bond to the wall.

> **Metal sheets:** they are available in different qualities and sizes, and in different materials such as CGI and aluminum. They are used in roofing and walls.

> **Metal openings:** frames and openings used for doors and windows and made of steel or aluminum.

> **Finishing components:** the market of finishing components such as tiles, windows, doors, plumbing and sanitary, appears to be covered only by international trade without any evidence of local production, even though these particularly affect the final price of buildings (Atta et al, 2021).

> **Plastic materials:** different plastic materials are used in construction, from plastic sheets for emergency shelters, to anti-damp plastic membranes or PVC window frames common in higher standard constructions.

> **Paint:** different types of paint are available.

OTHER MATERIALS

> **Clothes:** used for *aool* mats in *aqal* and for covering of buul. Ropes can also be made with old clothes.

► CONSTRUCTION MATERIALS AVAILABILITY

In each location, it is necessary to address information about eventual material shortages, availability of certain materials along the year, problems of transportation, scarcity, best season for collection of local materials, etc.



Construction of a reinforced concrete structure with hollow blocks infill in Mogadishu – CC UN Photo / Stuart Price



Imported squared timber and CGI sheets are used in recent constructions. Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Aool, used as decoration in *aqal* and nomadic compounds – CC Shafi



Many houses and construction have vivid paint colors in their facades. Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Mix of flat and sloped roofs in Eyl, Puntland – CC Heimo Liendl

► COMMONLY USED MATERIALS: IMPACTS, BENEFITS AND BETTER PRACTICES

	IMPACTS	BENEFITS	BETTER PRACTICES
Timber	<ul style="list-style-type: none"> Extraction can cause forest destruction, landslides, land degradation, and habitat destruction and can increase flood risk, flash flooding and further droughts and a downward spiral of increased hardship. Tree harvesting is not engaged in most IDPs hosting areas with wood instead being sourced from natural forest and bushland meaning increased pressure on natural assets. During hard times, households often harvest local wood for selling as charcoal with great impact on the environment. Where poorly managed processing takes place, mills cause solid-waste pollution, noise and air pollution. Using toxic chemicals for treatment causes environmental and health hazards. Most squared timber is imported. Revenues concentrated on a few people. 	<ul style="list-style-type: none"> A renewable resource, if well managed. Encourages community self-reliance as it makes self-building possible. Timber reduces the economic dependence on the construction materials market, preventing indebtedness. It may contribute to local economy, through livelihoods for local communities. Community forestry projects can provide sustainable livelihoods to neighbouring communities. Mitigating the impacts of climate change is particularly important in areas where heavy rains cause flooding and topsoil erosion, which deforestation can only exacerbate. Thinnings from new established plantations can be utilised for firewood within two years with construction timber available within 3-4 years of establishment after an initial investment of species development of 4-5 years. 	<ul style="list-style-type: none"> Do not overdesign / over specify where possible, conduct proper structural design and calculate timber needs accordingly. Minimise cut-offs. Treat timber properly to ensure its long-term durability. There are certainly several local recipes to treat timber that may vary locally depending on the availability of products. Encourage timber reuse (e.g., door and window frames, roof members). Chemically treated timber cut-offs should be considered hazardous and never be used as firewood. Minimise the use of timber for formwork, prefer reusable modular formwork instead.
Bamboo	<ul style="list-style-type: none"> Bamboo in Somalia needs procurement on regional and international bamboo stocks as it is not sufficiently harvested locally. Overharvesting means that greener bamboo is being used while it does not meet the standard of dryness required to extend its longevity. Given its invasive nature, bamboo can quickly take over nearby forests. Mostly imported material. Revenues concentrated on a few people. 	<ul style="list-style-type: none"> The area under growth in Somalia is not recorded (it is a local material both in Kenya and Ethiopia). However, bamboo has the potential to control desertification as it would reduce the impact on natural forests. It can be grown along the riverbanks. The high strength, low cost, rapid growth and high availability of bamboo makes this an ideal resource. Replenishes rapidly and over-extraction can usually be managed, except for massive pressure. The complex root system of bamboo can be used to stabilize unstable embankments and slopes. 	<ul style="list-style-type: none"> Good crop management practices can increase bamboo crop yields by up to 400%. The best seasons for harvesting bamboo are usually the rainy ones, but it is necessary to study the best season in Somalia. Encourage reuse (e.g., door and window frames, roof members). Never dispose of chemically treated bamboo in water courses. Chemically treated cut-offs should be considered hazardous and never be used as firewood. Treat bamboo properly.
Other vegetal materials	<ul style="list-style-type: none"> Natural or farmed vegetation (e.g., palm leaves, reed, grasses, branches, roots) is used in thatching, in <i>aqal</i> mats and in wattle and daub walls (<i>baraako</i> and <i>mundul</i>). Without proper management, negative impact on forests and natural vegetation may ensue. Household or small-scale industrial material. Material use is seasonal. Many types of vegetal materials are a biproduct of agriculture so would go to waste if not used for construction or animal feed. Has a limited lifespan, due to its susceptibility to rot and insect infestation, but if smoked by indoor fire, this lifespan may increase. 	<ul style="list-style-type: none"> No requirement for quarried or imported materials. No firewood or energy requirement. Can support local livelihoods and valorise local knowledge. Does not harm the environment since it is biodegradable and renewable. 	<ul style="list-style-type: none"> Use local knowledge where possible. Use basic building designs. Support local livelihoods and industries. Consider fire risk in planning and design since thatch is combustible.
Earth (soil)	<ul style="list-style-type: none"> Earth is a healthy material without toxic compounds (unless contaminated with toxic waste). Possibility of quarry problems (availability and management). Unplanned soil quarrying can cause landslides and hydro-geological impacts. Extraction may leave large pits which can cause health hazards. 	<ul style="list-style-type: none"> Used for millenaries in Somalia (wattle-and-daub - <i>mundul</i> and <i>baraako</i>-, earthen floors, plasters, adobe walls in the north...). These building cultures result from knowledge, knowhow and a collective intelligence improved over generations, through trials, failures and successes. Local material, does not need transportation. Earth does not create pollution and waste. Recyclable if it is not stabilised. Great variety of solutions, which allows for comfort if combined with knowledge on the bioclimatic conditions of each site. Effective regulator of humidity in indoor spaces, which increases comfort. Encourages community self-reliance as it makes self-building possible. Earth reduces the economic dependence on the construction materials market, preventing indebtedness. Stimulates local activity by favouring production, processing and trade at the local level. 	<ul style="list-style-type: none"> Make use of local knowledge and local building cultures where possible. Newly introduced techniques (such as adobe in most parts of the country) need training to local skilled workers and inhabitants before being potentially useful. Extracted earth can benefit the creation of canals, retention basins, plinths, etc. Improve wall resistance with plinths built with stone, concrete or other inert materials. Avoid the implementation of massive earth walls in high flooding prone areas. Support local livelihoods and industries.

40 DESCRIPTION OF LOCAL HOUSING AND SETTLEMENTS

	IMPACTS	BENEFITS	BETTER PRACTICES
Stone	<ul style="list-style-type: none"> Extraction of rock from quarries involves blasting. Quarries cause noise, dust, air pollution, habitat destruction and vibration if not properly managed. Unplanned rock quarrying can cause landslides and hydro-geological impacts. Without planning and protection blasting leads to occupational hazards. Transport may affect rural roads. Extraction may leave large pits which can cause health hazards. 	<ul style="list-style-type: none"> Used for millennia in Somalia (coastal areas). These building cultures result from knowledge, know-how and a collective intelligence improved over generations, through trials, failures and successes. Local stone does not require transportation and does not create pollution and waste. Recyclable. Great variety of solutions, which allows for comfort if combined with knowledge on the bioclimatic conditions of each site. Effective regulator of temperature (thermal inertia) in indoor spaces. Stone construction may encourage community self-reliance as it makes self-building possible when locally available and mastered. It reduces the economic dependence on the construction materials market, preventing indebtedness. Building with stone can stimulate local activity by favouring production, processing and trade. 	<ul style="list-style-type: none"> Make use of local knowledge and local building cultures where possible. Use good packaging/loading practices when transporting. Design and construct properly to ensure long-term durability. Only use in areas where stone can be extracted without causing hazards or environmental impacts. Use as much as possible earth mortars. Use preferably local lime mortars when earth is not suitable.
Cement based materials	<ul style="list-style-type: none"> Requires cement, quarried and mined materials (sand, gravel...). River sand or river gravel extraction contribute to riverbank erosion and displacement. Extraction of sand erodes channel beds and riverbanks causing undercutting and collapse of riverbanks, loss of adjacent land, erosion, downstream changes in patterns of deposition, destruction of riverine habitats. Extraction of rock from quarries for gravel involves blasting causing noise, dust, air pollution, habitat destruction and vibration if not properly managed. Unplanned rock quarrying can cause landslides and hydrogeological impacts. Imported material. Revenues concentrated on a few people. 	<ul style="list-style-type: none"> Particularly resilient to extreme weather, flooding and earthquakes if correctly designed and implemented. No firewood required, although the construction of many concrete structures requires scaffolding and supports often made with eucalyptus poles and plywood sheeting. 	<ul style="list-style-type: none"> Use alternatives to concrete/ mortar, e.g., earth walls. Use if possible prefabricated concrete items. Never dispose of concrete in the environment. It can be reused on-site/off-site for construction purposes (e.g., filling), safely transported to a construction material recycling facility, safely transported to a sanitary landfill.
CGI sheets	<ul style="list-style-type: none"> Manufacturing process requires large quantities of metals. May contribute to negative mining impacts. CO2 production impacts on climate change. Manufacturing takes place in large scale factories using energy intensive processes. Factories can cause severe air and water pollution, if poorly managed. Manufacturing processes may release toxic heavy metals. Transport can damage rural roads. Dangerous in strong wind situations: potential uplift of CGI sheets due to strong winds and improper fixations that may cause injuries. Cause discomfort and health issues. Edges can be very sharp, so carrying and handling sheets of CGI can be dangerous, and thick gloves should be worn. Imported material. Revenues concentrated on a few people. 	<ul style="list-style-type: none"> They are easy to carry and lightweight so no important structures are required to support them. CGI sheeting is valuable and can be sold if dwellers need to raise funds, for example in a disaster or post-disaster context. 	<ul style="list-style-type: none"> Use optimum design calculations to minimise cut wastes. Use certified products and avoid implementing in corrosive environments (e.g. seaside). Avoid contact with ground or high levels of moisture if using on wall panels. Encourage reuse of uncorroded sheets from old buildings, unless you suspect they have been stolen during conflict.

Most of the content in this table has been contextualized for Somalia adapted from WWF, 2016: [Environmental guide to Selection of Common Building Materials](#).

4.6. ORGANIZATION OF CONSTRUCTION

► SELF-CONSTRUCTION

As explained before in this document, many Somalis have skills and experience in self-construction. It is the case of most vernacular typologies and many typologies responding to the humanitarian situation, where there are important levels of engagement of households in different stages of construction.

Help from mutuals and neighbors also exists, and will be addressed in the next chapter.

► INFORMAL SECTOR

There are many small enterprises or single masons and carpenters in the country who work mainly in the informal sector. Some levels of participation of households are possible in this sector, from gathering local materials to participating as helpers during the construction works.

Employment and self-employment linked to informal construction include a range of income generating activities, and in bad years construction accounts for the greater part of casual labor earnings (FSNAU & FEWS NET, 2016).

Apart from work in the construction of buildings, there are other income generating activities linked to construction (FSNAU & FEWS NET, 2016):

- Bush products are a source of income and include collection of construction materials such as poles or sticks, fabrication of woven mats, collection of grass for house thatching... These products are sold in local markets.
- Construction also creates a demand for stones and gravel traded from the zones surrounding cities. Collecting and selling stones for construction is also an income generating activity. Limestone is also extracted, shaped and sold to make a living by poor workers.

► FORMAL SECTOR

It is possible to identify different typologies of construction companies: small local firms, medium local firms and international medium firms with foreign management and headquarters using a local workforce (Atta et al, 2021).

Local firms install imported building materials while following fully manual procedures for building material production (Atta et al, 2021).

Medium-size firms employ both imported ready-to-use materials and on-site production materials for basic building components (concrete blocks or concrete load-bearing

structures), which is achieved by using manual or semi-automated machinery (Atta et al, 2021).

Experienced skilled workers are usually employed to design and construct buildings in the formal sector, as it is cost effective. Specialized workers take part in different stages of construction: masonry/plastering work; carpentry/CGI work; plumbing work; pouring concrete; electricity; tiling work; aluminium work; roofing work.

Men are hired seasonally to work on construction projects in the main towns. Labor migration to urban areas takes place during the *jilaal* season (dry and hot season from December to March), and most work is found in the construction sector (FSNAU & FEWS NET, 2016).

► WOMEN IN CONSTRUCTION

Today, women can work in construction as helpers (*kuli*) in the formal sector. Women also usually fetch water for construction and participate in the collection of materials, particularly in informal construction.

Women earn income by working on house (for example in *mundul*) maintenance (thatching and mud smearing application) (FSNAU & FEWS NET, 2016).

Also, very often, both in formal and informal construction, family women cook food for the group of participants in the construction (skilled or unskilled, family members or not), what becomes a work overload for them while the construction works are ongoing.

► CONSTRUCTION TRADES

Contracts are most usually verbal, and families choose the building workers following different criteria such as personal knowledge, word of mouth (recommendation from someone else/friend/relative), of quality of work, availability or cost (Sevillano Gutierrez, 2023). Payment to workers is done both per task and per day.

► SEASONALITY IN CONSTRUCTION

All seasons are suitable for the construction of each housing typology. Nevertheless, sometimes the rainy season is preferred because during cold environment it is more comfortable to construct a house, and because in the hot dry season it is difficult to get some trees and water as materials for construction (Sevillano Gutierrez, 2023).

[5] Analysis of local building cultures

5.1. LIFESPAN, MAINTENANCE AND ADAPTATION

(+) Positive points

Choice of the site

- (+) The choice of the site (naturally elevated site, vegetal protection against strong winds...) is a practice contributing to increase the buildings' lifespan.

Aqal

- (+) When correctly selected, treated against termites with the traditional method, bound with goat twine or camel leather (called *jill*) and well maintained, the main structural elements of *aqal* can last up to twenty years (Fullerton & Adan, 1995).
- (+) The shape and constructive simplicity of the *aqal* has many advantages: the lack of vertical walls and a roof simplifies the process of assembling it (Marco, 1994).
- (+) Once the *qabax* is inside the foundation hole, pebbles are pounded with a hammer or big stone in the hole surrounding the *qabax* to give it added strength, and probably to help drainage in case of rain and to protect the structure from moisture. After that, sand is used to fill the holes (Fullerton & Adan, 1995). This practice gives the *aqal* structure extra durability.

Baraako and *mundul*

- (+) The maintenance of these vernacular typologies is mastered by inhabitants, who can make their houses last longer on their own means.
- (+) *Baraako* houses allow easy extension of constructions, as walls can be easily cut or extended, and it is easy to open new doors or windows in the existing structure, what helps families adapt to evolving needs.
- (+) These techniques are mastered by important parts of the population in the center and south of the country.

Transitional shelters

- (+) Transitional shelters such as hybrid ones can be upgraded with durable materials with the own IDP resources. When families can save some hundred USD, they can complete the walls with blocks (Shelter Cluster Somalia, 2016b). When that is not possible, the hybrid shelter is already a dignified solution.
- (+) While the cost of a transitional shelter is higher than that of an emergency shelter, the lifespan of the first one is considerably longer and the cost in the long term becomes also lower (Koclejda et al, 2022).

Stone constructions

- (+) Whitewashing and other maintenance practices help increase their durability.

Extensions

- (+) IDP households build extensions when they have the possibility and the need, generally soon after the first construction is built. Extensions are usually built with local (*baraako*: sticks and mud) or reused materials (old CGI sheets). They can be separate constructions (like *buul*) when the land plot is big enough.



The practices presented in this section are not exhaustive and represent only a sample of those existing. Some need to be better documented. They are constantly evolving and must be analysed on a localized scale.



Aqal structures can last for more than 10 years when the elements are well selected, treated and maintained – CC Shafi



Mundul. The maintenance of these constructions and other vernacular typologies is mastered by their inhabitants – © Shelter Cluster Somalia



Extension of a CGI house using local materials and techniques (*baraako*). Baidoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre

(-) Negative points

Plastic sheeting solutions

- (-) The harsh weather conditions contribute to the faster deterioration rate of plastic sheeting frequently used in emergency typologies faster than their designed life expectancy and requires replacement every six months (Koclejda et al, 2022).



Plastic sheeting solutions are not very durable in the Somali climatic context. *Buuil* in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre

Lack of maintenance

- (-) Lack of maintenance and know-how to undertake it is a problem. For instance, earth constructions (*baraako*, *mundul*, adobe) need periodic maintenance (wall smearing, drainage, application of termite repellents, roof repair to keep away rain...) to make them last long.



Extensions

- (-) Some extensions are built without considering the impact on neighboring houses. Sometimes the reuse of materials includes for instance households who use timber from the main construction's trusses for extensions.



Some families use part of the roof trusses of their main house for constructing extensions. Baidoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre

5.2. BIOCLIMATIC COMFORT

(+) Positive points

Site planning

- (+) The proximity of the buildings in historic neighborhoods of some coastal cities form a dense and intricate urban fabric, what creates a natural ventilation system that makes the streets cool, breezy, and shaded from the sun (Adbulkadir Ahmed et al, 2021; Scikei, 2007).



Whitewashed stone building with windows with wooden lattice to provide shading and privacy inside the houses. Small cafe with veranda, spaces with a lot of use during hot conditions. Berbera, Puntland – CC Ignacio Gallego

Orientation (wind and Sun)

- (+) The prevailing wind direction in Somalia is from the east from November to March, the hottest season (Muchiri, 2007). The eastern direction of the wind must be considered to maximize the natural ventilation, as it is possible to improve ventilation by locating the buildings oriented at an angle of about 20–30° concerning the east and following a staggered pattern (Del Pero et al, 2021).
- (+) To protect the buildings from the sun and minimize heat gains the longer facades of a building should face north and south orientations, which are easy to protect with small overhangs (Del Pero et al, 2021).

Ventilation

- (+) Ventilated ceilings or double roofs help prevent overheating.
- (+) Courtyards are not only spaces for socializing but also an answer to the geography and climate of the country. Many vernacular compounds include shaded courtyards to improve natural ventilation (Scikei, 2017).
- (+) In some historic neighborhoods of coastal cities several houses have light wells that stretch over several floors, which are systems of strategic openings to capture light and ventilation (Adbulkadir Ahmed et al, 2021).
- (+) In some areas (especially on the coast), the windows are placed close to the ground, which allows ventilation that benefits the inhabitants who usually sit on the ground.



Shading devices help protect openings from solar radiation. Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre

44 ANALYSIS OF LOCAL BUILDING PRACTICES

Insulation

- (+) Vegetal materials such as thatched roofs, *aqal* woven mats and stick walls have a good insulation capacity.

Shade

- (+) In vernacular architecture, there is a use of shadow to hide from the harsh sunshine at noon or afternoon times (verandas, etc.), which is a very important factor in this architecture (Said, 2019).
- (+) Large trees shadows are used for different activities: rest, reception of visitors, etc. They are pleasant spaces during the day, where thermal sensation is better thanks to the air currents. Trees also have productive purposes. Moreover, vegetation should be arranged to provide shade without interfering with natural ventilation (Del Pero et al, 2021).
- (+) Shading devices (e.g., overhangs, windows with wooden lattice, curtains) protect openings from direct and indirect solar radiation. In many vernacular stone houses these devices exist. The external ones are more effective in controlling solar gains (Del Pero et al, 2021).
- (+) Vegetation is particularly important to the east and west of houses to protect these facades from solar radiation (Del Pero et al, 2021).

Finishings

- (+) Light color building materials (clear CGI sheet roofs and whitewashed walls) help minimize conducted heat gain.

Aqal

- (+) *Aqal* are suited to the arid and hot climate: they are cool during the day and warm during the night, thanks to their natural ventilation system (Mire, 2015).
- (+) The dome-shaped *aqal* offers the smallest possible surface to solar radiation. This contributes to living comfort (Marco, 1994).
- (+) *Alool* cloth mats serve as room partitions, doorway and to keep the wind out. The weaving of mats starts 8-10 cm off the ground and therefore it allows some ventilation (Fullerton & Adan, 1995).
- (+) Mats keep the wind out keeping the *aqal* warm at night (Fullerton & Adan, 1995).
- (+) There are simple mechanisms to control the ventilation and temperature inside *aqal*, as some mats can be opened or closed depending on climatic conditions.

Baraako and mundul

- (+) In hot regions, *baraako* and *mundul* are left unplastered to favorize inner comfort through ventilation. In other zones, the lower part of walls is usually washed away by rains, and it allows for a good ventilation during the hot season.
- (+) In plastered *baraako* and *mundul*, well-being conditions are related during the day to the micro-cracks formed in the thin layer of earthen plaster affecting its entire thickness: through these crack, weak air currents naturally active between the sunniest and the shadiest part of the building are determined (Marco, 1994).



Aqal have simple mechanisms for the control of inner ventilation and temperature. *Aqal* in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Low windows (allow good ventilation at the ground level where people usually sit down) in all the houses in a street. Puntland – CC Heimo Liendl



Baraako are left unplastered in hotter regions to allow easy ventilation, better insulation and comfort – Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Earth construction provides comfort thanks to its thermal inertia and to its capacity for moisture regulation. *Baraako* and *mundul* also offer ventilation thanks to micro cracks in earth plaster. Baidoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre

- (+) The envelope disposes of a small amount of accumulated heat (thermal inertia) in a short time when the sun goes down, and so conditions of equilibrium of temperature radiation between walls and man are established (Marco, 1994).
- (+) Earth walls (*baraako*, *mundul* and adobe) help regulate humidity inside buildings thanks to their porosity and capacity to absorb excess humidity from the air, which increases the evaporation capacity of the air and contributes to comfort.



Vegetation in a street of Luuq Ghanane (Gedo, Jubaland) – CC Francois Decaillet

Stone and earth masonry (adobe) constructions

- (+) Earth and stone walls reduce the amplitude and rapidity of temperature variations in buildings, thanks to their thermal inertia, ensuring thermal comfort.
- (+) Masonry clastra or perforated blocks in walls favor the entry of light and the free flow of air, without needing to install expensive and sometimes culturally inappropriate windows (Adbulkadir Ahmed et al, 2021).

(-) Negative points

Plastic sheeting solutions

- (-) Plastic tents are hot during the day, cold at night and have little durability.

Excessive size of openings

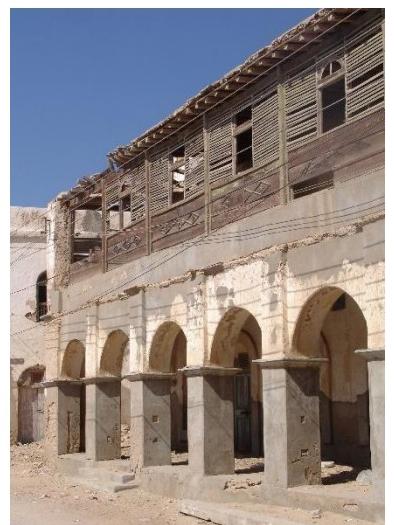
- (-) In globalized style houses wide windows and doors create indoor high temperatures (Said, 2019).

Loss of flat roofs

- (-) In coastal areas, the current predominance of metallic sloped roofs has reduced the creation of new flat roofs which were (are where they exist) spaces for relaxing and social interaction at nighttime (Adbulkadir Ahmed et al, 2021).

CGI sheet houses

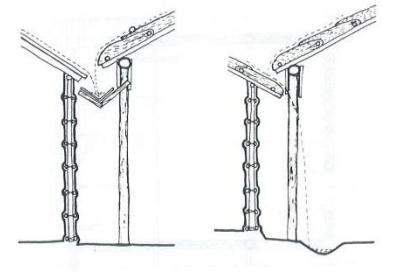
- (-) CGI sheets reflect some of the sun's rays, but also heat up and radiate heat into the house. During the day, the interior of houses quickly becomes very hot. As the metal rusts, it becomes darker and less reflective, and the buildings get hotter and hotter. Because of this, people spend their days and many nights outside the constructions searching a shadowed and ventilated space.
- (-) In a study undertaken in Baidoa (Sevillano Gutierrez, 2023), inhabitants negatively valued CGI sheet houses from a bioclimatic comfort perspective, and positively their traditional *baraako* houses which don't get that hot.



Stone house with porch in the ground floor and terrace protected with timber clastra in the first floor, which create ventilated spaces. Berbera, Somaliland – CC Charles Fred



Bioclimatic comfort inside CGI sheet houses is nonexistent. Baidoa, South West State – CC Enrique Sevillano Gutierrez, CRAterre



Traditional water collection systems – © Javier Bonifaz, CRAterre

5.3. ENVIRONMENTAL ISSUES

(+) Positive points

Water collection

- (+) There are different traditional methods for rainwater collection within houses, from gutters to superficial drainage and *berkad*.
- (+) Communities in several zones of the country have managed to collect rainwater in public scale infrastructure such as *wars*.

Sustainable use of resources - *Aqal*

- (+) For the construction of *aqal*, women do not touch the main foundation root of acacias, as it is far too deep and its removal would destroy the tree, they use the lesser roots (Fullerton & Adan, 1995).

46 ANALYSIS OF LOCAL BUILDING PRACTICES

Efficient cook stoves

- (+) Energy efficient cook stoves decrease the use of charcoal by up to 50%, which is a positive evolution as charcoal is known to have severe social, health and environmental implications (De Clerq, 2021).



Collective war (rainwater reservoir) near Baidoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre

Local materials

- (+) Local materials such as earth or stone have low environmental impact as they require less transport and usually low or no transformation (Koclejda et al, 2022).
- (+) When local wood is used in construction, the impact on the environment should be measured (Koclejda et al, 2022), and sustainable management systems should be implemented. *Baraako* and *mundul* are vernacular, climatically, and culturally adapted techniques mastered by the population of the zones where they exist, what makes them dignified shelter options if timber resources are available and sustainably managed.
- (+) Alternatives to timber exist, such as adobe construction, (mud bricks) can be produced and have been already successfully implemented in Somalia. Nevertheless, training and efficient follow-up by professionals who are familiar with this technique are necessary to have good results.



Adobe (sun-dried earth bricks) are a potential locally produced alternative to the traditional wattle and daub technique which can have a negative impact in deforestation – CC Enrique Sevillano Gutiérrez, CRAterre

(-) Negative points

Water scarcity

- (-) Water is scarce in many areas, particularly during the dry season. This has an impact not only in families daily use, but also in construction when techniques using important amounts of water are used (for example use of cement blocks and mortar, concrete, or adobe masonry).



Three stones cooking system, very inefficient in terms of firewood consumption and dangerous for potential fire spread – CC IHH Humanitarian Relief Foundation

Deforestation

- (-) The wood used to construct some types of shelters is now rare due to deforestation. While it was traditionally available in most parts, today it is mostly acquired commercially. Because of limited purchasing power for most people, these shelters are becoming less and less affordable.
- (-) People burn the acacia trees (which need years to regenerate and which they need for their homes) into charcoal for international trade (Mire, 2015).
- (-) Also, firewood collection supposes a threat to the sustainability of forests in Somalia. The most common system for cooking is the three stones system, a very inefficient method in terms of energy consumption, and a dangerous method in terms of fire spread (open to wind).
- (-) The demand for timber for the formal construction industry also means damage to woodland areas (FSNAU & FEWS NET, 2016).
- (-) Vernacular *baraako* and *mundul* are built with wattle and daub walls using local sticks. If this technique is used at large scale, it could have a destructive force on the surrounding environment (Shelter Cluster Somalia, 2016a), particularly if no reforestation and sustainable management measures are taken.



Timber is used in most types of construction. There is a need to think about the problems linked to deforestation and to import of timber – CC Enrique Sevillano Gutiérrez, CRAterre

5.4. HAZARD-RESISTANT PRACTICES



STRONG WINDS

Aerodynamics

- (+) The aerodynamic dome-shape of the *aqal* (and *buul*) offers the smallest possible surface to strong winds pressure for the same covered floor area, which contributes to the living comfort, safety and overall economy of the work (Marco, 1994). Moreover, the *kebed* and other protection mats constitute a protection against the strong *Jiilaal* winds (Shafi, 2007). Moreover, the door is placed in the opposite side of the direction of dominant winds.
- (+) *Mundul*, thanks to their circular shape, have a good resistance to the horizontal strength of wind, which does not find obstacles to continue its way. They have a good stability thanks to a good distribution of the forces on the whole wall, which prevents them from deforming.
- (+) Some *baraako* and other constructions such as CGI sheeted ones have aerodynamic hip roofs which help better stand strong winds.

Construction aspects

- (+) Once the structural elements of the *aqal* are inside the foundation holes, pebbles are pounded in the holes, and sand is added to fill the holes, all of which give the *aqal* added strength for example against strong winds. This system also helps drain rainwater and protect the structure from moisture. The structural reliability of *aqal* is tested by women by strongly shaking them (Fullerton & Adan, 1995).

CGI sheet houses

- (-) Strong winds, and even mild ones have important effects in CGI sheet walls houses, which are destroyed by them, not only the roof but also the walls.



HEAVY RAINS / STORMS

Protection of the walls

- (+) Many *baraako* houses have four sloped roofs with overhangs, which protect facades from sun radiation and from rain.
- (+) Doorsteps to prevent water from entering houses are a common practice.
- (+) Drainage is an important strategy to keep wall bases free of moisture and direct contact with water.

Roof

- (+) Flat roofs have evacuation systems for rainwater.



FLOOD

Choice of settlement site

- (+) When possible, communities settle in elevated places to avoid the risk of flood.

Sandbag dams

- (+) In several parts of the country, communities build sandbag dams in periods of flood risk, both at infrastructure level and at domestic one.



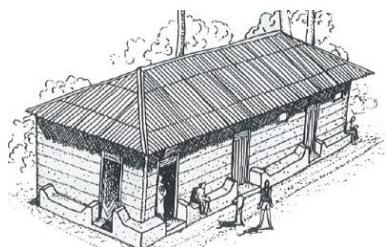
It is necessary to consider all the risks that may affect an area, and not only the one that may be considered preponderant.



Aqal have very good resistance to strong winds thanks to their shape. Moreover, their door is placed in the opposite side of dominant winds and woven mats help control wind entrance. Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Step in house door to keep rainwater out of the house. Janaale, South West State – © Thierry Joffroy, CRAterre



Baraako with a hip roof with important overhang to protect the walls, and a surrounding bench which serves as sacrificial mass for the walls in case of flood or heavy rain – © Javier Bonifaz, CRAterre



Sandbags are used in different zones of the country in periods of flood risk. Dam in the Shabelle river – CC ICRC

48 ANALYSIS OF LOCAL BUILDING PRACTICES

Protection of the base of constructions

- (+) Sometimes earth constructions have stone foundations and plinths which help walls resist rain and runoff water.
- (+) Sometimes, the walls have a sacrificial mass, like a bench surrounding the construction. This bench helps protect the walls of the house.
- (+) In flood prone areas, many houses are constructed on raised earth or earth and stone platforms which help protect the core structure from erosion. This is accomplished by raising up an earthen mound above the average annual flood level. The edges of the earthen platform work as a sacrificial mass in case of floods. This solution is effective and can be done at minor cost. Regular maintenance is required to ensure its effectiveness.
- (+) In periodically flooded areas floors level are raised to ensure more resistance.



Village built on a dyke during a flood period. Marere district, Jubaland CC ICRC



These *baraako* houses are built on a small earth mound what helps protect them from common flooding. Janaale, South West State © Thierry Joffroy, CRAterre

Lack of drainage systems and waste management

- (-) Lack of drainage systems and insufficient waste management originate aggravated flood problems.



FIRE

Protection of the walls

- (+) Families are aware of the fire risk and take measures to avoid it such as cooking in places protected from wind. One solution once fire has started in IDP camps is that people rapidly demount all the *buul* surrounding the place where fire started so it cannot spread. This is more difficult with other types of houses.
- (+) Settlement planning which avoids congestion and shelter designs that minimize the use of flammable materials can mitigate the risk of fire.
- (+) Ventilated covered kitchens well situated in plots in the opposite site to wind direction could help women have a better health condition and reduce fire risk.



Flat roofs with tubes for the evacuation of rainwater. Berbera, Somaliland - CC Ignacio Gallego



Households have strategies to try to avoid fire spread such as protection of kitchens from dominant winds. Baidoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre

Cooking and congestion

- (-) Fires in settlements (particularly in IDP camps) are common due to cooking and their spread is fast due to overcrowding. Congestion in IDP camps is a great problem aggravating fire risk.



BLACK COTTON SOILS

If possible, avoid building in black cotton soils zones

- (+) Building on black cotton soils is to be avoided when possible because the change in water content has a big impact of shrinkage and swelling in these soils containing clays highly reactive in contact with water. This fact may cause crackings and even the collapse of buildings standing on these soils.

Avoid alteration of water content in the soil

- (+) A good strategy is to avoid any risk of altering the water content of the soil supporting the building. Verandas and large roof overhangs avoid the risk that changes in humidity associated with rain will swell the soil under the walls.
- (+) The inclination of the ground surrounding the building is also a strategy to evacuate water away from the site.



The geographic areas with presence of black cotton soils (*vertisols*) in Somalia are quite large in the center and the south of the country. *Vertisols* are a soil type in which there is a high content of expansive clay minerals, many of them known as montmorillonite, that form deep cracks in drier seasons or years. There is a need to build in these areas following some considerations.

- (+) Trees have an impact on the amount of water in soil and depending on the time of year and soil type may cause the ground to heave or subside. Buildings should be constructed outside of the canopy of any tree
- (+) Drainage systems help evacuate water from the wall bases.

Architectural and constructive features

- (+) Constructions with relatively reduced dimensions as well as several constructions disconnected from each other help adapt more easily to the movements of the ground and therefore crack less due to its expansion and retraction.
- (+) Within a masonry building, there needs to be a disconnection of the walls for example in the openings or in the middle of facades, so that walls meet in the angles and there is a possibility for each angle of the building to move without making the whole building crack.

Flexible materials and techniques such as *mundul* and *baraako*

- (+) Vernacular building technologies such as *mundul* and *baraako* fit well to black cotton soils, as the buildings are light and flexible so they can move with the soil's movements due to variation in moisture content (Joffroy et al, 1992). This would also be the case for CGI sheet houses and other houses with timber structures.



Wood species

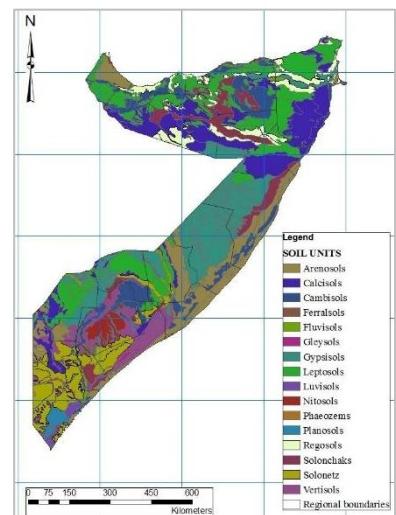
- (+) Termites are very frequent in rural and urban areas. Some local woods are termite-proof, and are very durable (Joffroy et al, 1992), even though these trees may be endangered today because of deforestation problems.

Local solutions

- (+) The acacia roots used for the *aqal* structure are warmed with ash and shaped during one week, after what they are treated with a solution of the bark of the acacia tree, called *asal*, which protects them against termites. The poles are (Fullerton & Adan, 1995).
- (+) The holes to embed in the soil the structural *qabax* used as structure of the *aqal* (semi-circular shaped poles) are dug about 45 cm (mid-arm) and salt or myrrh are put in the holes to keep away the termites (Fullerton & Adan, 1995).

Wood species

- (-) Imported sawn wood or plywood is frequently attacked. Termites affect joinery, doors, windows, frames, planks, furniture and carpentry (Joffroy et al, 1992).



Somalia map of soils. Black cotton soils (vertisols, in purple) are present mainly along the coast in the south and center and in the Bay Region (South West State) – © Boitt et al (2017)



Plywood panels used in some hybrid shelters are very easily attacked by termites. Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Women helping each other to make an *aqal* in Hargeisa, Somaliland – CC Shafi



Women in a compound cooking during a rainy day (near Beletweyne, Hirshabelle) – CC - Frank Keillor

5.5. INCLUSION: GENDER AND DISABILITIES

(+) Positive points

Women's mutual support

- (+) The *aqal* is a result of female know-how and collective effort (Mire, 2015).

Safety, privacy, and gender segregation

- (+) Women prefer to live in the center of IDP settlements where they feel protected, especially at night, and close to the latrines and water taps (Bonnet et al, 2020).

50 ANALYSIS OF LOCAL BUILDING PRACTICES

- (+) Having at least two rooms is a cultural necessity to have gender segregation.
- (+) Safety and privacy must be provided through well-designed facilities and shelters, using quality materials as well as interior locks in doors of shelters and latrines, and sex-segregated sanitation facilities. Durable shelter solutions, such as adobe or *baraako* houses, benefit of locked rooms and segregated rooms, which are safer and can mitigate GBV risks.
- (+) Some IDP and informal settlements are surrounded by sparsely populated areas, posing a security risk for those needing to pass through this zone, particularly for unaccompanied women and girls. To travel to city centers, most women indicated that for security they do it in groups (Bonnet et al, 2020). This also happens for firewood collection.



Woman interlacing straw (*caw*) to make woven mats for *aqal* – CC Shafi



Woman cooking with an improved stove in Mogadishu – CC UN Photo - Ilyas A. Abukar



Three stones cooking system, very inefficient and dangerous for potential fire spread – Baidoa, South West state – CC Enrique Sevillano Gutiérrez, CRAterre

Support from other groups for accessing housing

- (+) In some cases (Bonnet et al, 2020) single/widowed/divorced women and female-headed households receive assistance with building materials from humanitarian agencies, build the shelters themselves with relatives, or are given temporary shelter by neighbors, a relative or the settlement manager.
- (+) Some people living with disabilities in IDP settlements receive help from relatives or community members to build their shelters (Bonnet et al, 2020).

Improved stoves

- (+) Improved stoves are a plus for women (in charge of cooking in Somalia), as they helps save firewood and thus help women save time in their lives, breath less smoke, and more importantly be less exposed to dangerous situations when looking for firewood as they need to go to the bushes less often. Improved stoves can be made of mud, for example.

(-) Negative points

Vulnerable groups

- (-) Within IDPs and urban poor, the most vulnerable people are female- and youth-headed households, people living with disabilities (PLWD), and young single men.
- (-) Young men often carry the stigma of being likely to cause trouble or to join the ranks of al-Shabaab, so are denied access to shelter (Bonnet et al, 2020).

Women's rights

- (-) Women's rights and opportunities are limited by social laws, particularly regarding access to housing. Indeed, women are very dependent on men to acquire property, rental housing, or even temporary shelter (Bonnet et al, 2020).
- (-) Women have significantly fewer economic opportunities that would enable them to afford housing by themselves; they also have less access to relevant personal connections necessary to acquire housing than men.

People living with disabilities (PLWD)

- (-) Infrastructure (such as latrines) does not cater in any way to the special needs of physically or mentally disabled people (Bonnet et al, 2020).
- (-) Consideration of PLWD's needs is almost nonexistent and there is no specific national policy framework regarding PLWD, although the Provisional Constitution does recognize and provide for the protection of their rights (Bonnet et al, 2020).

Firewood collection and cooking system

- (-) Firewood collection takes a lot of time for women, but more importantly it is a very risky activity which puts them in high danger: sexual violence is very common in the bushes. Women do not have proper tools, so collecting firewood gets more difficult. Moreover, the inefficiency of the cooking system on three stones makes it necessary to collect more firewood than using a more efficient method.

Insecurity and lack of infrastructure

- (-) Most IDP camps and informal settlements have insufficient latrines, and many residents have no choice but to use the bush, and at night this is a security risk for women and girls (Bonnet et al, 2020).



Mosquito nets are used by most households to protect against malaria.
Doolow, Jubaland - CC Enrique Sevillano Gutiérrez

5.6. HEALTH AND HYGIENE ISSUES RELATED TO HOUSING

(+) Positive points

Availability of latrines

- (+) Shared latrines are acceptable during emergencies, but it is recommended to include private latrines, bathing facilities, and cooking areas within the shelter whenever possible (Koclejda et al, 2022). Private latrines are planned when the tenure situation is secure.



Lack of sufficient latrines is a problem in IDP camps. Doolow, Jubaland CC Enrique Sevillano Gutiérrez

Mosquito nets

- (+) Mosquito nets are present in most households for protection against malaria.

(-) Negative points

Smoke

- (-) Breathing smoke from firewood or charcoal (a less used but still used fuel for cooking) creates big health problems to women.



Waste is generally burnt or thrown away in nature. Water course obstructed by waste, increasing flood risk in Baidoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre

Insecurity

- (-) Insecurity is a preoccupation in some IDP sites, often linked to darkness at night.

Sanitation

- (-) Due to the lack of proper sanitation facilities in 2020 23% of Somali population (World Bank) continued practicing open defecation, causing health problems.
- (-) According to interviewed households in IDP sites in Baidoa, sanitation is a big issue, as many times the number of users per latrines can reach up to 100 people from different households. Also, showers often can be a challenge due to the lack of water (Sevillano Gutiérrez, 2023). Hygiene conditions get very hard.



Bioclimatic comfort is not good inside plastic sheet walls shelters. Baidoa, South West State – UNHCR - African Volunteers for Relief and Development

Waste management

- (-) There is not a generalized system of waste management. Households throw waste in nature or burn it. Waste management is a problem for hygiene and health, for environment and for flood hazard, as waste obstructs water courses.
- (-) Garbage is generally burnt and there is a lot of litter around settlements posing a health hazard, especially for children who play there (Bonnet et al, 2020).

Materials which create health problems

- (-) The use of metal sheets and plastic sheets in walls causes discomfort and can lead to health problems.

52 ANALYSIS OF LOCAL BUILDING PRACTICES

5.7. USE AND AESTHETICS

(+) Positive points

Internal partitions

- (+) In addition to bigger houses with more space, internal partitions are a priority for most households, particularly regarding the sharing of shelters between different family units (extended family) and the need of cultural gender separation.



At least two rooms are preferred by IDPs for cultural reasons of gender separation –
© Shelter Cluster Somalia

Sufficient surface

- (+) In a shelter programme run by an SSC member, different prototypes of shelters were constructed to similar budgets: one of cement blocks, one of stabilized soil blocks and one of corrugated iron sheets (bigger size as cheaper prize per m²). Households had to choose a shelter type based on their needs and preferences. More than 80% opted for the larger corrugated iron sheet house, with adequate space and privacy being the main determining factors for their selection (Goddeeris & McDonald, 2017).



Even small size trees are very appreciated by local community, as they spend many time in hot daytime under their shadow.
Baïdoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre

Outdoor life

- (+) Culturally, people spend long time outdoor, either in their plot (particularly women) or in public spaces (particularly men). Shadows are crucial, as they are comfortable places during hot hours, but also places for social interaction.
- (+) Nomads do not spend their days inside the *aqal*, which is a shelter used when it rains and to keep belongings safe. They spend most of the day outdoors and even usually men do not sleep inside either (Marco, 1994).

Privacy and interaction

- (+) In traditional urban neighborhoods, spaces for privacy and interaction are structured in a particular way. Inner courts allow the possibility of enjoying an intimate yet still open space, and terraces provide the opportunity to interact with neighbors and perform domestic activities (Adbulkadir Ahmed et al., 2021).



Inside a wedding hut decorated with woven mats and gifts of dishes in Madow, Jubaland © Jorge Acero

Research of beauty and aesthetics

- (+) In *aqal* mats, different colors are used, particularly red, white, black, and brightly colored imported dyes (Fullerton & Adan, 1995).

Wellbeing and cultural adaptation

- (+) In line with Sphere Standards, shelter designs should include at least (Koclejda et al, 2022): 4.5–5.5 square meters of living space per person, including cooking space and bathing and/or sanitation facilities; internal floor-to-ceiling height of at least 2.6 m at the highest point; two rooms for a household of five people; adequate living space for daily activities, for protection of possessions and key assets, for ensuring privacy and gender separation, separation of different age groups and families within a household according to cultural and social norms.

(-) Negative points

Safety and security

- (-) *Aqal* and *buul*, by design, have a woven mat as a door covering, they do not accommodate a hinged door. As safety, security and protection concerns rise, this design becomes disadvantageous. The design also leaves a small opening at the back to allow for air circulation. Small animals (the size of a cat) and crawling reptiles can enter and cause harm.

Overcrowding

- (-) Most shelters are overcrowded. Many IDPs live in extended families because of the insecurity situation, which is making more people get to the camps. IDP households have 7.6 persons per household in average (World Bank Group, 2020), and they live together in shelters which make around 16 m² or less.
- (-) One-room shelters are not adapted due to local and cultural practices. A two-room permanent shelter as a final durable solution is the preferred option for most households (Shelter Cluster Somalia, 2016c).



Local materials foster local economy. Stone houses in Puntland - CC Heimo Liendl



Construction of a rainwater catchment in Garoowe, Puntland - CC ICRC



Cement blocks are not a replicable alternative for IDPs. Two persons carrying concrete hollow blocks in Mogadishu – CC UN / Tobin Jones

5.8. ECONOMIC ASPECTS

(+) Positive points

Use of local materials and labor

- (+) In the case of the CGI construction, the cost of non-local materials adds up to 80% of the costs while in an adobe construction, the non-local materials would add up to 30% of the cost, while 70% would be invested in local labor: making the sun-dried bricks, masonry construction, plastering of the walls, collection of soil mortar... (Shelter Cluster Somalia, 2016a).
- (+) The use of local resources and techniques (Local Building Cultures) can help reduce the cost of shelter in the long term (Shelter Cluster Somalia, 2016e). Opening public resources sites (stone, sand, earth) for beneficiaries can promote the use of local materials (Shelter Cluster Somalia, 2016c).
- (+) Each dollar invested in transitional shelters with local materials will also support the local economy through local employment, production of local construction materials, reinforcement of the national supply chain, etc. (Koclejda et al, 2022).

(-) Negative points

Non-affordable and non-replicable solutions

- (-) Cement-based shelters are expensive and not sustainable for beneficiaries to upgrade and maintain, as most beneficiaries are often not able to replicate this building technique due to the high costs involved (Shelter Cluster Somalia, 2016b; Shelter Cluster Somalia, 2016c). The SC has noticed after many different evaluations that the construction techniques like cement-block construction are not sustainable for the vulnerable population groups (Shelter Cluster Somalia, 2016e). For example: less than 5% of the beneficiaries who received a cement block house were able to expand their house with the same construction technique (Goddeeris, n.d.).
- (-) Stone block housing is quite expensive and needs cement mortar. This solution will not be able to be replicated by the beneficiaries to expand their house (Shelter Cluster Somalia, 2016b).
- (-) In terms of access to housing in Mogadishu, the biggest discriminating factor is wealth. IDPs make up the majority of the informal settlement residents, but the city's poor also reside there for similar reasons: affordability of shelter, access to services, and security (Bonnet et al, 2020).



Baraako under construction in Jenaale, South West State – © Thierry Joffroy - CRAterre



Income generating activities linked to shelter projects can be numerous, from construction to production of materials (Doolow, Jubaland) - CC Enrique Sevillano Gutiérrez, CRAterre

54 ANALYSIS OF LOCAL BUILDING PRACTICES

5.9. SOCIO-CULTURAL PRACTICES THAT PROMOTE RESILIENCE

(+) Positive points

Neighborhoods and houses to promote social interaction and sense of community

- (+) Some neighborhoods of Mogadishu such as Shingani and Xamar Weyne still have a total absence of boundary walls, common in new constructions. The proximity of buildings and close contact between neighbors has sustained the social interaction and strong sense of community (Adbulkadir Ahmed et al., 2021).



Spaces for social interaction are crucial.
Eyl, Puntland – CC Heimo Liendl

Self-construction

- (+) It is eminently uplifting to construct your own home (Mire, 2015) in a crisis, as well as to be able to maintain it and to extend it when needed. Increased self-reliance, dignity and well-being can be facilitated by incorporating flexibility into the shelter design for livelihood opportunities and potential for IDPs to adapt the shelter (Koclejda et al, 2022).

Owner-driven approach

- (+) The homeowner-driven approach entails providing IDPs with cash and/or materials in kind to build their houses. They may undertake the construction work by themselves, by employing family labor, local laborers, or by using a combination of these options. This approach more empowering and dignified for households, and it is also often faster and cheaper (Koclejda et al, 2022)



Pastoralists with their *aqal* demounted and charged on camel's backs. Banta, Jubaland – © Jorge Acero

Solidarity mechanisms

- (+) Giving shelter and food to the traveling visitor is a cultural institution among Somalis (Diriye Abdulahi, 2001).
- (+) Savings groups called *Ayuuto* (Somali for “help”) are very common interest-free rotating savings schemes based on mutual trust and primarily run by women in the same neighborhood who know one another and share common experiences. Groups of up to 15 members pool money in a common pot where each member pays a fixed amount. The money is handed over to one person and the next collection goes to another in a similar process until every member receives their pot. *Ayuuto* is an alternative for poor women who live in the displacement camps who do not have access to formal financial services. Beside money, it is a safe space to connect, share their challenges and support each other (Hujale, 2022).



Mutual support for the construction of a *buul* in an IDP Camp in Garowe, Puntland – © NRC



The goob is a system of mutual assistance in construction. Collective construction of a *mundul*. Banta, Jubaland – © Jorge Acero

Mutual support in construction / access to housing

- (+) *Goob* is a system of mutual assistance which exists in construction (and in agriculture), particularly in vernacular models such as *baraako* or *mundul*.
- (+) There is also support for example through groups of elders who organize the collection of help for vulnerable people such as new IDPs. Elders ask households to share contributions for the newly arrived: mats, jerrycan, plastic sheets...
- (+) Most IDPs build their own shelters, mainly *buul* which do not have cost for materials or for labor. The only cost is associated with the rental of the plot where the *buul* will be installed (Bonnet et al, 2020). Many IDPs receive initial help from informal settlement managers, or from friends and relatives (Bonnet et al, 2020).

Mutual support in the construction of *aqal*

- (+) Making the *aqal* is a collective effort by women, who sing and recite poems during construction (Mire, 2015)

- (+) The types of mats *caws* or *harrar* are finished by braiding the top fringe of grass and it is an occasion for celebration (the ceremony is called *tidic*) where young, unmarried women are invited in the evening to finish the mat while singing songs, which is not a difficult task, but a social event (Fullerton & Adan, 1995).
- (+) The finalization of the mats called *kebed* is a communal effort, and it is a festive ceremony in which the owner will start and invite others (eight to ten women) to join after she has completed a first part (Fullerton & Adan, 1995). All materials must be ready, and enough food and drink for all. The work takes several days, and once women commit to do it, their families will not migrate until it is finished.

Coping strategies regarding livelihoods

- (+) In order to cope with changes in weather patterns and other hazards, households have coping strategies such as adjusting the timing of mating and birthing, migrating, selling first quality goats in pastoral areas, or adjusting the sowing season and the types of crops at the first rains in areas with crop production (FSNAU & FEWS NET, 2016).

(-) Negative points

Loss of social interaction through new construction models

- (-) New developments such as gated communities in cities encourage a culture with less hospitality and sense of sharing (Adbulkadir Ahmed et al., 2021).



Gathering of men in Eyl, Puntland – CC - Heimo Liendl



New developments don't encourage community live and sharing. Gated communities in Mogadishu – CC - Axmadyare

5.10. IMPROVABLE BUILDING PRACTICES AND RECOMMENDATIONS

► SITE SELECTION AND URBAN PLANNING

Improvable practices

- (-) Bad choices (or lack of choice) in location and planning of shelters and settlements bring problems related to hazards, land tenure insecurity, durability of shelters, lack of connection with economic poles and facilities, etc.

 These improvable practices and recommendations are not exhaustive and represent only a sample.

Recommendations

- (+) Safe and secure locations as close as possible to town centers should be selected for new settlements, offering adequate space and access to essential services and livelihoods (Koclejda et al, 2022).
- (+) Where possible, new settlements could include lands for agriculture/livestock (Koclejda et al, 2022), recreation and market.
- (+) Areas prone to hazards such as flooding should be avoided. Where this is not feasible, appropriate civil engineering, site planning, and investment in disaster risk reduction should be used to mitigate the risks (Koclejda et al, 2022).
- (+) Location of camps should consider the safety and dignity of inhabitants in aspects such as access to water and sanitation, and accessibility of the sites for PWD.



Access to water is essential when planning a settlement. Water borehole in Baadley, South West State – CC – ICRC

► KNOWLEDGE AND KNOW-HOW

Improvable practices

- (-) The lack of technical knowledge is a problem. Construction with all kinds of materials suffers the effects of structural instability resulting from poor

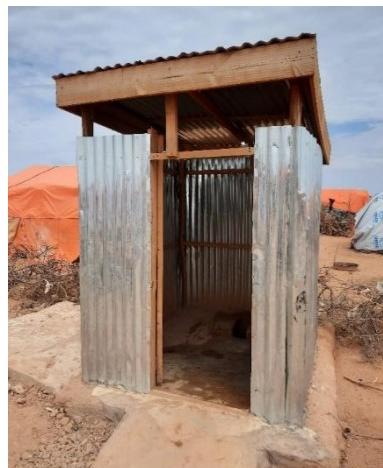
56 ANALYSIS OF LOCAL BUILDING PRACTICES

workmanship and inadequate maintenance. Flooding, high winds, and other hazards only diminish the durability of constructions that have not been properly designed, constructed and maintained.

- (-) Bad design and choice of materials and techniques of shelters bring important problems related to effects of hazards in shelters, durability of shelters, lack of economic opportunities for IDPs, maintenance, cultural appropriateness, etc.

Recommendations

- (+) It is important to ensure safe, dignified, and adequate shelter solutions, and contribute to the safety and well-being of the population (Koclejda et al, 2022).
- (+) Training of skilled workers and sensitization of inhabitants for maintenance practices are essential to improving the quality of work, promoting maintenance, and making homes more durable.



Access to sanitation and accessibility for PWD are crucial aspects for dignified settlements. Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre

► SETTING-OUT, FOUNDATION, BASEMENT AND WALLS

Improvable practices

- (-) Lack of proper drainage, foundations and water-proof plinth is a problem for the durability of houses. Also, connection between wall and roof are a key point of constructions which is not always well designed and constructed. Bad construction practices can also pose big issues to the durability of buildings.
- (-) Earthen constructions are not very durable when they do not have a foundation or base made of waterproof materials, or at least a protection system for the base of the walls (protection mass of soil).
- (-) CGI sheeted walls can easily be blown off and the timber structure destroyed by strong winds if not properly built.
- (-) There is a phenomenon of cracking of the walls at the corners of the construction (particularly masonry walls), caused by the fact that the soil on which the whole building is built is not stable, or that there are variations in water content between one point and another of the foundation, thus causing differential settlements under the building. This is usual in black cotton soil areas.
- (-) Cement blocks often have insufficient quality due generally to low cement dosage or poor production with insufficient wet curing of blocks.



Stone foundation and plinth for protection of the wattle and daub walls and with a bench function. Baidoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre



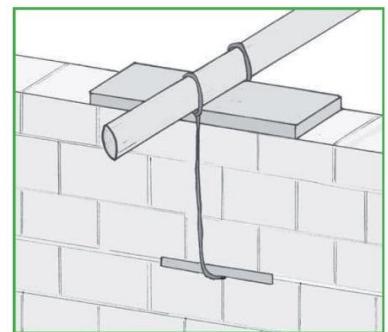
Rainwater easily enters many shelters and floods them (Baidoa, South West) – CC Enrique Sevillano Gutiérrez, CRAterre

Recommendations

- (+) Drainage is crucial to avoid stagnating water at the base of the buildings.
- (+) In flood prone areas (especially flash floods and close to river banks), the site should be preferably on high location and with a slight ground inclination, or the shelter should be built on a mound to avoid stagnating or rushing water at the foundation level (Shelter Cluster Somalia, 2016f).
- (+) Avoid building on a plot that has been filled, on a plot that has erosion caused by wind/rain (Shelter Cluster Somalia, 2016f). The soil needs to be of good quality to hold the weight of the building (Shelter Cluster Somalia, 2016f).
- (+) To reduce the risk of wall cracking due to differential settlement, the base of the walls should not be exposed to changes in water content. Possible solutions include: constructing a deep foundation that allows the building to be placed on

firm soil; managing the slopes around the house so that water drains away from the base of the walls and thus does not affect the soil under the foundation; and constructing perimeter drains to move water away from the building.

- (+) The plinth (upper part of the foundation outside of the ground) protects the base of the walls from stagnating water, from animals, from wind (Shelter Cluster Somalia, 2016f). In earth constructions such as adobe ones, a plastic sheet working as water barrier should be placed between the foundation and the wall (Shelter Cluster Somalia, 2016b).
- (+) If the walls are built with adobe, it is good to have an impermeabilization on top of them (cement plastering or a row of cement stabilized blocks).
- (+) Curing of cement-based materials is crucial. Cement needs water to harden out and all blocks need at least 4-5 days of water to ensure that all the cement has hardened out properly. It is important to ensure that all produced blocks are kept humid during the curing process (Shelter Cluster Somalia, 2016b).
- (+) Bracing and better foundation can help CGI sheeted houses stand, as well as the installation of fascia boards in the roof so wind does not blow off roofs.



Technical detail for a simple and correct connection between a masonry wall and timber roof framework - © CRAterre

► ROOFING

Improbable practices

- (-) A poorly constructed roof exposes walls to sun and rainwater and can negatively affect the durability of the rest of the shelter.
- (-) The risk of CGI sheets being blown off during high winds is widespread, which is either due to anchoring that is too weak to withstand the overpressure phenomenon created inside the house during high winds, or due to the fact that the sheets have an external grip on the winds and are lifted from their support.
- (-) Winds blowing from the sea in the coastal areas carry salty humidity which is corrosive and attacks binders, lime, cement, roofing iron sheets...

Recommendations

- (+) Good coverage of the roof is important to protect the walls from both the sun and the rain (Shelter Cluster Somalia, 2016b).
- (+) To avoid blow off of CGI roofs due to overpressure inside the buildings or to insufficient anchorage, it is necessary to avoid important building heights; to improve the anchoring of the roof to the building; to respect the number of rafters; and to respect the minimum nailing of the sheets on the rafters using roofing nails, among others. Four sloped roofs can also help avoid overpressure.
- (+) Roofing materials in coastal areas must be as resistant as possible to corrosion.

► OPENINGS

Improbable practices

- (-) Poor quality of openings is one of the causes of roofing sheets blow off during high winds. When openings cannot be properly closed, wind rushes into the house and creates overpressure that can blow the roof off.

58 ANALYSIS OF LOCAL BUILDING PRACTICES

- (-) The installation of a door often creates problems, as the door tends to blow off (e.g., due to wind). The slamming caused by insufficient anchoring severely erodes the opening angle causing the door to eventually crack and tear off.

Recommendations

- (+) Avoid putting the openings of the buildings towards the rains. To lower inner temperatures, avoid putting the openings towards the horizontal sunshine (particularly east and west).
- (+) If possible, use good quality doors and windows that are securely fastened to the walls by multiplying the number of 20 cm (at least) deep anchors.
- (+) Door and window systems are also important against strong winds. It is necessary to be able to close them properly, so the wind does not rush into the house and blow the roof (or CGI sheeted walls) off.
- (+) Doors and windows, if well positioned and hinged to the structure can play an important role in regulating temperature and avoid weakening the frame.



Adobe is usually not visible in urban houses, where it is protected with a plaster. Here, because of a lack of maintenance, we can clearly see an adobe wall in Berbera, Somaliland – CC Tristam Sparks

► FINISHINGS

Improvable practices

- (-) Cement coatings are suitable for cement-based or stone walls, but not for other structures. In fact, there are detachments of plasters for example in earthen walls, which is often due to the incompatible characteristics of the plaster and the wall. When the plaster and wall materials have a different coefficient of shrinkage - swelling depending on temperature and humidity, that leads to a shearing phenomenon at the interface between the two elements (Moles, 2019).
- (-) It may happen that the water vapor transfer coefficient of the two elements is different, and the flow of moisture from the interior to the exterior is stopped at the wall/cement interface. As a result, the earth where the plaster is bonded becomes wet, loses its cohesion, and the plaster falls (Moles, 2019). This often happens with cement plasters on earthen walls.
- (-) Plasters can also delaminate by gravity due to excessive thickness. Thickness also allows more water climbing by capillarity, and these buildings are more prone to termite attacks, as their galleries are well protected in the free space created between the wall and the finishing (before this last one delaminates).

Recommendations

- (+) Plasters should be thin and perspiring and should preferably be applied in several thin layers to avoid the peeling of a thick plaster by gravity.
- (+) To avoid plaster delamination in earth constructions it is necessary to apply a plaster whose characteristics will accommodate the movements of the earthen walls (Moles, 2019): same characteristics as the wall (earthen plaster), or characteristics close to those of the wall (lowly dosed cement plaster).
- (+) Earth-based plasters or lime should be used to cover earthen walls (wattle and daub or adobe).

[6] Typologies responding to the humanitarian crisis

The following classification of shelter solutions is taken from Somalia Shelter Cluster document "[Shelter Types](#)" (2022). Costs are just indicative as they tend to fast increase.

6.1. EMERGENCY SHELTER SOLUTIONS

► TENT (TEENDHO)

> **Type of shelter:** Emergency

> **General description:** Many IDPs receive assistance by humanitarian organizations through delivery of the entirety of materials necessary to build a tent.

> **Construction process:** Construction materials gathered by organizations (mostly imported) and assembled by inhabitants (Shelter Cluster Somalia, 2022).

> **Construction elements**

Structure: Metallic bars.

Walls and covering: plastic sheets

Anchorage to the ground: guy ropes.

> **Inner space:** Single space with little furniture and goods.

> **Cost (2022):** USD 450-500 (Shelter Cluster Somalia, 2022)



Tent, a type of emergency shelter – © Shelter Cluster Somalia

► EMERGENCY SHELTER KITS (ESK)

> **Type of shelter:** Emergency

> **General description:** Many IDPs receive assistance by humanitarian organizations through delivery of the entirety of materials necessary to build a shelter. These shelters are called Emergency Shelter Kits (ESK).

> **Construction process:** Construction materials gathered by organizations (mostly imported) and assembled by inhabitants (Shelter Cluster Somalia, 2022).

> **Construction elements**

Structure for walls and roof: Timber sections (40 mm x 40 mm), nails and binding wire.

Walls: plastic sheets, nails, ropes.

Roof: plastic sheets, nails, ropes, binding wire.

Openings: Secure door with lock.

> **Inner space:** Single space with little furniture and goods.

> **Cost (2022):** USD 250-300 (Shelter Cluster Somalia, 2022).



Timber structure of an Emergency Shelter Kit in Baidoa – © UNHCR / African Volunteers for Relief and Development



Shelters built with Emergency Shelter Kits (ESK) in Baidoa, South West State – CC Enrique Sevillano Gutiérrez, CRAterre

60 TYPOLOGIES RESPONDING TO THE HUMANITARIAN CRISIS

► TIMBER AND PLASTIC SHEET WITH CGI ROOF

> **Type of shelter:** Emergency

> **General description:** Many IDPs receive assistance by humanitarian organizations through delivery of the entirety of materials necessary to build a timber and plastic sheet with CGI roof.

> **Construction process:** Construction materials gathered by organizations (mostly imported) and assembled by inhabitants (Shelter Cluster Somalia, 2022).

> **Construction elements**

Structure for walls and roof: Timber sections (40 mm x 40 mm), nails and binding wire.

Walls: plastic sheets, nails, ropes.

Roof: CGI sheets, nails, binding wire.

Openings: Secure door with lock. Window.

> **Inner space:** Single space with little furniture and goods.

> **Cost (2022):** USD 400-500 (Shelter Cluster Somalia, 2022)



Emergency shelter built with timber and plastic sheet with CGI roof – © Shelter Cluster Somalia

6.2. TRANSITIONAL SHELTER SOLUTIONS

► CGI TRANSITIONAL SHELTER

> **Type of shelter:** Transitional

> **General description:** CGI shelters exist in Somalia not only as a response by humanitarian organizations, but also as housing for low-income families and IDPs ([CGI self-built shelter](#)) and for middle-income households ([CGI middle-income housing](#)).

> **Construction process**

CGI Transitional shelters are constructed by professionals and/or households. Materials are recyclable by the beneficiaries and easy to transport.

> **Construction elements**

Foundation: stone, cement, concrete.

Structure for walls and roof: Timber or bamboo sections, nails, and binding wire.

Walls: CGI sheets, nails.

Roof: CGI sheets, nails.

Openings: Secure CGI door with lock. CGI window(s).

> **Inner space:** Single space without partitions, or some partitions existing usually self-made by families. Some belongings are stored and there can be some simple furniture such as beds.

> **Cost (2022):** USD 400-1000 depending on the size, the number of rooms... (Shelter Cluster Somalia, 2022)



CGI Transitional shelter in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Interior of a CGI shelter in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre

► REFUGEE HOUSING UNIT

> **Type of shelter:** Transitional

> **General description:** The RHU is comprised of a lightweight steel frame, a roof, wall panels, door and windows, floor covering, a solar energy unit, and an anchoring system. The prefabricated RHU 1.2 is delivered in a “ready-to-assemble” kit.

> **Construction process:** Four persons are needed to assemble this prefabricated house (UNHCR, n.d.).

> **Construction elements** (UNHCR, n.d.)

Anchoring system: Foot anchors consist of one 500 mm ground pipe connected to a ground plate and a ground joint. Anchors are connected to the plate with steel wire.

Steel frame: A prefabricated galvanized steel structure which consists of ten vertical poles to connect the anchoring system (footing) of the RHU with the roof structure.

Semi-hard plastic wall and plastic roof panels: There are roof panels and wall panels. The panels are produced from a 5 mm thick polyolefin sheet with a UV barrier on the outside and a reinforcement layer on the inside.

Solar energy unit: The RHU can include a solar panel.

> **Inner space:** It offers 17.5 m² of covered living space within a single room.

> **Cost** (2022): USD 3000 – 3500. Materials with international shipment USD 1500. Assembling, building platform and thermal comfort at local level USD 1500 – 2000.



Refugee housing units – © Shelter Cluster Somalia



Refugee housing unit under construction in Doolow, Jubaland – © UNHCR



Refugee housing units in Doolow, Jubaland – © UNHCR



Hybrid shelter in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Interior of a hybrid shelter in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre

62 TYPOLOGIES RESPONDING TO THE HUMANITARIAN CRISIS

► BARAAKO SHELTERS

> **Type of shelter:** Transitional / permanent

> **General description:** They have rectangular plans, generally pitched roofs and can have a veranda. They have improved foundations and wall elevations made of wattle-and-daub, vernacular local building technique.

> **Construction process:** Professionals with some collaboration by households.

> Construction elements

Foundation: stone and cement mortar.

Walls: natural sticks.

Roof: three sloped roof with timber framework and CGI sheets.

Openings: 1 window, and 1 door.

Finishing: plaster made with earth and cow dung.

> **Inner space:** It measures around 5 m x 4 m.

> **Cost (2022):** USD 1000-1200 (NRC, 2021; Shelter Cluster Somalia, 2021a, IOM)



Baraaiko shelter built by IOM in Baidoa – CC Enrique Sevillano Gutiérrez, CRAterre



Interior of baraaiko shelter built by IOM in Baidoa – CC Enrique Sevillano Gutiérrez, CRAterre



Baraaiko prototype - © NRC

► TO FIND OUT MORE

NRC. (2020). DURABLE SHELTER TYPOLOGIES

https://sheltercluster.s3.eu-central-1.amazonaws.com/public/docs/presentation_from_nrc_on_shelter_response_in_baidoa - 5_prototypes.pdf

6.3. PERMANENT SHELTER SOLUTIONS

► STONE OR CEMENT BLOCK WALLS WITH CGI ROOF

> **Type of shelter:** Permanent

> **General description:** The implementation of this type of house is not a widely used solution in humanitarian assistance, as it becomes quite expensive when compared to other solutions. Most of the times, these solutions are seen as evolutive and the construction is prepared to have extensions made by inhabitants.

> **Construction process:** The construction is generally undertaken by professionals with the eventual contribution of inhabitants.

> **Construction elements**

Foundation and plinth: stone and cement + plastic sheet between plinth and adobe elevation to prevent water rise from the ground and plinth to the wall.

Wall: Stone or cement blocks + cement mortar + cement coating as finishing (not always). Cement blocks masonry walls are built, as appropriate, un-grouted, partially grouted or fully grouted for enhancing their structural strength (Atta et al, 2021).

Roof: Timber structure and CGI sheeting.

Openings: Timber or CGI door plus window(s).

> **Inner space:** They can have one or two rooms, depending on the size (commonly from 4 x 4.4 m to 4 x 6 m). They can have or not a veranda. They can have simple furniture.

> **Cost** (2022): USD 1500-2500, depending on size, number of rooms and presence or not of veranda (Shelter Cluster Somalia, 2022)



Shelter built with cement blocks with possibility of extension in Garowe, Puntland – CC Malini Morzaria / EU-ECHO



Stone shelter with one room and a possibility of extension to the left once the family can gather the means for that – © Shelter Cluster Somalia



Stone shelter with two rooms and veranda in Doolow, Jubaland – CC Enrique Sevillano Gutiérrez, CRAterre



Finalized CSEB shelter in Kismaayo, Jubaland – © Shelter Cluster Somalia

► TO FIND OUT MORE

IOM. (2016). EXPERIENCES WITH LOCAL BUILDING CULTURE IN KISMAYO

https://sheltercluster.s3.eu-central-1.amazonaws.com/public/docs/presentation_1_iom_and_arc_kismaayo.pdf

64 TYPOLOGIES RESPONDING TO THE HUMANITARIAN CRISIS

Finishing: exterior earth plaster (earth + lime would be more resistant).

> **Inner space:** One or two rooms and simple furniture.

> **Cost (2023):** USD 2500 (IOM).

CASE STUDY – CSEB PROJECT IN KISMAAYO, JUBALAND STATE

(IOM, 2016; Shelter Cluster Somalia, 2016d)

Project implementers: IOM, ARC

Location: Kismayo, Jubaland State. IDP camp

Year: 2016

General information: The project gives response to some of the challenges IDPs face in Kismayo: congested camps, land tenure insecurity, evictions, and seasonal flooding among others.

Project preparation: Regarding CSEB blocks (Compressed Stabilized Earth Blocks), first soil tests were made to prove that soil contained enough clay to produce the blocks. Different samples of CSEB were produced for the different soil types. There were destructive testing of blocks when they are dry to prove resistance.

Also, there was a demonstration of different foundation techniques.

Dimensions: plan 4 m x 4 m / ceiling height 3 m.

Project strengths:

- + This permanent shelter is highly durable with regular maintenance.
- + The structure offers good ventilation and stays relatively cool in the hot climate.
- + Most materials are locally sourced, and beneficiaries fully participated during shelter pilot project.



Blocks production - © IOM



Stone foundation - © IOM



Elevation of CSEB walls - © IOM



Earth plastering - © IOM

[7] Conclusions: key points

► SITE SELECTION

- ➔ Security of tenure is a crucial aspect for dignified durable solutions in Somali IDP sites.
- ➔ The choice of the construction site is critical. It is recommended to take into consideration local knowledge, historical data, and the opinion of local authorities as to whether the area is subject to specific risks.
- ➔ Moreover, it is essential to build on a relatively compact ground so that the building does not move while considering the nature of the soil (especially for masonry constructions), which may be composed of expansive clays (black cotton soils) and require particular foundation solutions to avoid cracking of the buildings.
- ➔ The site selection must also consider access to water, to existing facilities (particularly health and education facilities), to energy for cooking, and to income generating activities and/or consider the creation of new facilities.
- ➔ An IDP site may evolve into a village or a permanent part of a city, which must be integrated in the initial planning. It is also important to think about the connections between an IDP site and the existing built environment.

► SITE PLANNING AND ACCESS TO WATER, SANITATION AND OTHER BASIC SERVICES

- ➔ Site planning must consider safe water points, sanitation, public lighting, and the division between public and private spaces. Also, enough surface for plots is necessary to avoid overcrowding.
- ➔ Access to improved sanitation facilities is crucial. The use of latrines by many households has an impact on health and security, particularly for women.
- ➔ Drainage systems (slopes, surface drains...) must be planned to avoid flooding problems during the rainy seasons.
- ➔ Trees must be planted so that bioclimatic comfort is achieved as well as to fit with people's cultural habits of spending time in outdoor shadowed spaces.

► LARGE HOUSEHOLDS, EITHER NUCLEAR OR EXTENDED

- ➔ Somali households have an average size of around 6 people, reaching 7.6 in IDP households (World Bank Group, 2020). The size of plots should take this fact into consideration.
- ➔ Also, Somalis live together both in nuclear families and in extended ones. When relocating due to a crisis or disaster, it is advisable to take this into consideration, so that residential units are not separated, and enough constructions and large enough plots are planned in shelter projects.

► CONSIDERATION OF CULTURAL ASPECTS RELATED TO HOUSING

- ➔ Most Somalis consider privacy, gender separation, security, and sensorial aspects (such as use of shadow and dim light indoors) in the housing design as essential for cultural reasons. There is a need to place these aspects at the core of shelter and settlements design to create locally adapted living environments in line with people's expectations and needs.
- ➔ At the private level, there should be different constructions or rooms for male and female children once they are teenagers. Therefore, there should be enough constructions built in a compound or at least partitions inside the main construction to allow for separate rooms.

66 CONCLUSIONS: KEY POINTS

► INTERIOR AND EXTERIOR SPACES AND EVOLVING HOUSES

- ➔ For most Somalis, the house is not a construction that groups together all the spaces (like a villa), but a compound with a set of spaces that are either open air, built or covered for various purposes. Courtyards play a very important role, as do covered outdoor spaces where many daily activities take place.
- ➔ Most Somalis do not build their compound all at once. They make their compounds evolve according to the means available, but also according to the needs of the family.
- ➔ It is necessary to provide big enough plots for the family to make extensions when the situation allows it.

► TAKE THE ENVIRONMENT INTO ACCOUNT

- ➔ Housing responses increase the resource extraction for construction materials. Pressure on timber use creates risks of environmental degradation and increases the risk of erosion, deforestation, landslides, and flooding. This can deprive communities of livelihoods and put people, infrastructure, and ecosystems at increased risk of disasters (WWF, 2016).
- ➔ The shelter sector should consider reforestation as a contribution for shelter solutions which will use timber responsibly.
- ➔ Also, several aspects can be considered to improve the bioclimatic comfort of houses:
 - thermal inertia (earth or stone), which helps reduce the variation of temperature in the interior of houses, and help regulate humidity (particularly important in situation of overcrowd),
 - shaded spaces around houses which can help minimize heat gains, particularly to the East and West (e.g., proximity of constructions, verandas, courtyards with vegetation, plantation of trees to the West of houses...),
 - window shutters and overhangs,
 - ventilation with openings position taking into account the balance between dominant winds (blowing from the East in the hot season in most of the country) and solar radiation (East and West orientations are to be avoided to reduce heat gains by solar radiation),
 - possibility to close openings for security reasons, for protection against sandstorms, and for pests' control,
 - position of windows thought to improve ventilation of interiors, as people usually spend their time on the ground or in low furniture (as beds or stools),
 - enough height of constructions which can help have less hot temperature in the inhabited space (lower part of the house's volume) while keeping the hot air high and ventilating it with some openings in the upper part of the walls,
 - light color building materials, whitewashing of walls,
 - choice of materials which don't heat up unbearably (earth, stone...).

► SUPPORT TO LOCAL ECONOMY AND TRAINING TO LOCAL WORKERS

- ➔ The main weakness of the existing housing is related to the poverty of the populations that does not allow them to build better houses. Thus, technical solutions that promote the circular economy, and that allow injecting most of the project funds into local economies should be preferred. If the funds remain within the local community, there will be an improvement of housing of the families supported by the sector, but also of the whole population.
- ➔ Construction is mainly carried out by informal sector masons. These craftsmen sometimes have the knowledge and skills to build quality constructions, but this is not always the case. Upgrading the skills of local craftsmen and women often leads to better results and to create the basis for a better overall quality of the built environment in the long term.
- ➔ Training in new technologies takes time (feasibility, production, construction, design, maintenance, repair). Techniques such as adobe, (traditionally used in parts of the north of the country, but unknown in most of the country), could be an alternative to wattle and daub. That would require training to local artisans and inhabitants.

► CONSIDERING LOCAL STRENGTHS FOR RESILIENT PROJECTS

- ➔ As discussed in Chapter 5, "[Analysis of Local Building Cultures](#)", the strengths of local building cultures represent an enormous potential. At each scale, the analysis of the cycles of production, use, regular maintenance or partial repairs, abandonment, and eventual recycling can produce enriching knowledge for the reverse engineering of local building cultures. In terms of methodology, participatory approaches are suggested to distinguish:
 - what is very valuable and should absolutely be kept,
 - what is very useful but has become difficult to apply, which implies studying the reasons for it,
 - what needs to be adapted to better meet today's requirements,
 - conversely, what has been modified from traditional models with negative impacts,
 - what is no longer relevant or has become negative in the current context and must absolutely be "replaced".
- ➔ Self-help systems and saving groups have historically been practiced by Somalis and still are, including in construction. At the time of construction (both for sedentary and nomadic houses), people can help each other build through mutual aid systems such as *goob*.
- ➔ The humanitarian sector can promote approaches that foster the use of these systems of mutual solidarity that contribute to the weaving of strong social ties and favor resilience.

► CHOICE OF CONSTRUCTION TECHNIQUES

- ➔ Plastic sheets (for walls and roofs) have several problems related to durability and comfort.
- ➔ The use of CGI sheets causes discomfort and can lead to health problems. CGI sheets reflect some of the sun's radiation, but also heat up and radiate heat into the house, which quickly becomes very hot during the day. As the metal rusts, it becomes darker and less reflective, and the interior of the building gets hotter and hotter.
- ➔ Despite the thermal discomfort, especially during the day, corrugated iron is a material with advantages, it is light (consequently it needs a light frame), can eventually be assembled and disassembled. To improve comfort under this type of roof, it would be advisable to provide ventilation systems, as well as false ceilings.
- ➔ Earth and stone are materials that can be recycled for life and can be obtained in almost all areas of the country (one or the other or both) in sufficient quantity and quality to build durable housing.
- ➔ The wattle and daub technique (used in *mundul* and *baraako* houses) is locally mastered in most places in the center and south of the country. It is affordable and promotes comfortable conditions in houses. This technique has other advantages such as its cultural adaptation and facility of construction and maintenance for households. However, wood-bush building technologies such as *baraako* are considered as increasing the deforestation problems in Somalia. This is the reason why a sustainable management of wood and bushes must be followed if these techniques are to be applied.
- ➔ Apart from timber, when the projects have a large scale, it is necessary to manage well the quarries of extraction of earth, sand, or stone to avoid damaging the environment.
- ➔ To improve the life span of earthen constructions, water must be kept away from the wall bases. This can be done in two main ways: by building a foundation of non-water sensitive materials, if possible, with a barrier against rising water; or by building houses on earthen platforms with slopes that help to drain rainwater away from the base of the walls. The sides of buildings exposed to driving rain should be protected with plasters compatible with the walls (avoid cement).
- ➔ Organic materials (wood for framing and thatch) have traditionally been used in *mundul* and *baraako* constructions and provide good comfort inside houses. The humanitarian sector could pilot the use of these techniques in shelter models.

[8] Additional resources and bibliography

↳ FOR MORE INFORMATION

ASSESSING LOCAL BUILDING CULTURES, A PRACTICAL GUIDE FOR COMMUNITY-BASED ASSESSMENT (CAÏMI, 2015)

<https://hal.archives-ouvertes.fr/hal-01493386/>

SELF-ASSESSMENT SUSTAINABILITY TOOL FOCUSED ON SHELTER AND SETTLEMENT RECONSTRUCTION IN THE AFTERMATH OF NATURAL DISASTERS: QSAND TOOL

<http://www.qsand.org/>

SUSTAINABLE HOUSING DESIGN TOOL TO ASSIST HOUSING PRACTITIONERS IN DESIGNING SUSTAINABLE HOUSING PROJECTS: SHERPA TOOL

<https://unhabitat.org/sherpa/>

8.1. KEY CONCEPTS

Adaptive Capacity: The ability of systems, institutions, humans and other organisms to adjust to potential damage, take advantage of opportunities, or respond to consequences².

Disaster: Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic or environmental effects that require an emergency response(s) to satisfy critical human needs and possibly external support for recovery².

Exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services, resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected².

Globalized habitat: Housing influenced by “global trends” promoted in the media, but also by industrial companies and the formal education system. Cement, steel and CI Sheets gradually replace traditional materials, but such changes don’t always result in real improvements. Difficulties in affording respect for norms and standards lead to compromising space quality, thermal comfort, and even structural safety.

Hazard: The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources².

Local building cultures: A building culture is the intangible dimension of what is produced by humans to live, work, thrive, etc. It includes assets related to each phase of the building life cycle: design, construction, use(s), maintenance, replacement, extension, adaptation, etc., that are linked to social, economic, environmental and cultural aspects. The genesis and evolution of building cultures are closely linked to their environment and the specific history of each

territory. This is why they are so diverse worldwide and why several building cultures can co-exist within a single territory.

Makeshift habitat: This covers different realities depending on the factors that generate it: economic difficulties, climate change, disasters, or conflicts. It characterises houses or shelters built by low-income families or those who, without a land property title, prefer to limit their investment by choosing light structures that are easy to dismantle or repair.

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure while also maintaining the capacity for adaptation, learning and transformation².

Risk: The potential for consequences where something of value is at stake and the outcome is uncertain. Risk is often used to refer to the potential for adverse consequences on lives, livelihoods, health, ecosystems and species, economic, social and cultural assets, services (including environmental services) and infrastructure.

Vernacular habitat: It is characterised by using local resources to respond to people's needs, way of life and local climate. It results from reproductions, improvements and ongoing adjustments or adaptations over time and often includes external inputs and imported solutions, though rather parsimoniously. Such constructions often rely on strong links between the inhabitants, their families and neighbours, and their persistence facilitates housing accessibility, pride and feelings of belonging within the community.

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt².

² (IPCC, 2014), AR5 Synthesis Report: Climate Change 2014

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